

1996
Revised

AERIALS

Kurt N. Sterba

& Lil Paddle

Foreword by
Walt Maxwell, W2DU



\$10



Digitized by the Internet Archive
in 2025 with funding from
Amateur Radio Digital Communications, Grant 151

<https://archive.org/details/chrs-lib-14>

AERIALS

By Kurt N. Sterba
and Lil Paddle

DISCLAIMER

This book is sold only for its entertainment or amusement value. The publisher makes no guarantee as to the technical merit of any article. In fact it is rather doubted that any antenna described by the author will work any better than a fifty-ohm resistor dunked in transformer oil, at the bottom of an elevator shaft.

Worldradio, 2120 28th St., Sacramento,
CA 95818 USA (916)457-3655

COPYRIGHT 1992, Worldradio, Inc.

All rights reserved. However, different from most publishers who threaten execution if you even so much as think about using one precious word from their book. . . we are pleased to grant permission to any entity that wishes to reprint one entire column per month (or any month). Please be so kind as to include our address and the price of the book. If you don't we'll be angry.

FOREWORD

The revealing nature of the material in this book makes it appropriate to begin by borrowing some words from ARRL's Executive Secretary, David Sumner, K1ZZ, writing in the "Foreword" of my book, *REFLECTIONS — Transmission Lines and Antennas*. Dave writes:

"Tune in a QSO in the amateur bands where the subject is transmission lines, standing waves, antenna matching, reflected power or antenna tuners, and what do you hear? A lively discussion, most likely! The chances are high that you'll also hear some information that is only half true, or perhaps just plain wrong. Myths and old-wives' tales about these related subjects prevail, even though some years ago *QST* carried a series of articles to dispel such misinformation. The series, "Another Look at Reflections," written by Walt Maxwell, W2DU, appeared as seven parts in *QST* issues from April 1973 through August 1976. . ."

That series of articles from *QST* formed the basis for my 24-chapter book, *REFLECTIONS*, which continues to highlight and correct additional misunderstandings concerning antennas.

But wait, there's more, much more! And it gets even better! I've been fortunate in having three eminently qualified colleagues assisting in my crusade for a better understanding of transmission lines and antennas: First, there's the late John Haerle, WB5IIR, who authored *The Easy Way*, (which I edited for publication). And now come Kurt N. Sterba and Lil Paddle, the noms de plume of the husband and wife team who write the *AERIALS* column appearing in *Worldradio*. Their articles contain hard-hitting, sharply-aimed rebuttals targeting many ludicrous statements and claims appearing in Amateur Radio literature and equipment catalogs. This book is a collection of articles selected from their column, and I am pleased to have been chosen by *Worldradio* publisher Armond Noble, N6WR, to review and edit their material for the book.

It's unfortunate that many of the prevailing myths and misconceptions concerning antennas and feed lines have been wrought by authors who published erroneous material, and also by the marketing departments of some manufacturers, who play loosely with the truth in exaggerating the performance claims for their products. And some manufacturers even present erroneous information concerning the operating principles of their products, with some instruction manuals containing data obviously written by someone who didn't understand the principles. I highlighted only a few examples of the problem in *REFLECTIONS*, but luckily for the Amateur, Kurt and Lil have uncovered many more examples, many that I didn't know existed. It's obvious from their writings that they have covered a wider range of Amateur Radio literature than I.

In reading this book you'll enjoy Kurt and Lil's writing as they expose the erroneous material with rapier-like jabs, puncturing and deflating outrageous claims with acerbic wit and choice humor. You'll also enjoy their good-natured verbal sparring — there's a lot more here than pure technical discourse! However, as with my *REFLECTIONS* many of Kurt and Lil's statements are bound to rattle some cages, and cause much gnashing of teeth in those of you who have been taken in by the myths. Therefore, with this book as their operating room, I know you'll be surprised to discover you've been educated, as well as entertained, in watching them perform selective surgery in separating facts from fiction. Happy reading!

Walt Maxwell, W2DU
ARRL Technical Advisor (TA) for
Antennas and Transmission Lines
DeLand, Florida
February 1992

PREFACE

Kurt N. Sterba is, by far, the most popular columnist in *Worldradio*.

That is, if popularity is measured by mail, pro and con. Some consider him gruff. Others know him as a man of charm, however none of those people write in. The comments of readers do range from "pay him anything he wants, he's worth it" all the way to "boil him in oil."

Where did we find Kurt? He was an instructor at the same institution where I was a student long ago. Was that the Army, technical school, a college or the university? I'll never tell.

In this collection of columns, urged by a vast number of readers, you may find one or more of your particular favorites. If in the selection process we deleted any of your favorites, we apologize.

Enjoy Kurt in the spirit that it is meant.

Armond M. Noble, N6WR
Publisher, *Worldradio*

INTRODUCTION

by Kurt N. Sterba

I hope you all enjoy reading this book as much as I enjoyed spending the money you paid for it.

by Lil Paddle

Oh, the burden I must bear!

1

Kurt N. Sterba

One subject that has been cussed and discussed is the vertical antenna. Some folks delight in mouthing the old saw that “Verticals radiate equally poor in all directions.” If so, why are they the antenna system used for broadcast stations?

You can bet your bottom Susan B. Anthony dollar that if any industry as greedy as the broadcast industry could come up with a way to burn their call letters into one more jackrabbit another microvolt out, they would do it.

The difference is that your local 250W jukebox does it right and we, alas, do it wrong. Seems that Ned Novice reads an ad somewhere that says “no radials needed” and believes it. He is also a candidate for “Learn to be a Brain Surgeon in a Weekend School.” But it’s not his fault, really. He saw it in the big magazine.

As the song goes, “It Ain’t Necessarily So,” or to be more precise, ain’t true at all. Here is the truth about verticals, straight and cheap. A vertical without radials is a total *disaster*. And a vertical tied into a ground rod is almost worse because one’s hopes were raised.

Baffling how one manufacturer tells Ned that if you roof-mount the vertical, one or two radials is all you need. Never could figure that one out, except maybe the manufacturer figured that after Ned spent all that money on the aluminum he’d have to dig into the milk money to afford a decent radial system.

You may cringe trying to figure out how to put 80M radials on your house. Well, you can run them out to the edge of the roof and then run them along the edge.

They don’t have to be all straight, dressed right and covered down. Our usual jumble of wires is good enough. Now, I’m not going to suggest you take a page from KRAZY radio’s book and lay out

120 radials. But that’s what they do and it works for them. (By the way, I once worked at the radio station described above, and we got an SWL card from Australia.)

The more radials you can get out, the better. The more radials you can get out, the better. No, the word processor didn’t have the hiccoughs. I thought if I said it twice, it might make an impression.

The extra radials don’t even have to be resonant length. Just get as much metal under the antenna as possible. A very good trick is to get a square of chicken wire (as big as possible), lay it under the vertical and tie to that.

CAUTION: This is a good idea for big signal, but not so great if you have a curious cat that gets on your roof. If such animal is standing on ground screen with nose on vertical and you go key down you will have one unhappy kid on your hands yelling and screaming about how “Daddy killed the kitty.”

Any kind of wire — fence wire, guy wire — anything. Just get out as much as you can. If you run *non*-insulated wire, do not get the end near the rain gutter. Sparks may jump and set dry leaves on fire, burning down the house. (Keep pulling stuff like that and Gladys will never get her license!)

But if properly done, a vertical antenna will give a very good account of itself. Where does one stop before the cost of wire equals the cost of a chauffeured limousine which can take you to everyone you would care to talk to? Sixteen is a good place to stop, unless, of course, this vertical is up on a 50 ft. pole and you wish to dazzle the neighborhood with your Christmas light display.

How will the optimum vertical perform? Be aware — crazy things can happen! You may cry woefully, “I’m 5 X 9 in Tokyo but they can’t hear me in San Diego.”

You may be asking "Which vertical should I buy?" There is the Hustler, a guy you want to stay away from in pool halls. There is Hy-Gain. The only person I ever knew named Hy used to smoke smelly cigars behind the counter at the pool hall. There is the Butternut. Great antenna, funny name. What's this world coming to? Would Eitel and McCollough start a tube company today and call it Chocolate Chip Tube Company?

Get the Butternut. At least if you take it on a DXpedition to the desert island of San Serife and you run out of food, you won't starve to death.

Next subject: shortened dipoles and the like. Rule of thumb... you can paint your Volkswagen "racing green" but that still won't turn it into a Ferrari. (That's Bob Ferrari; he runs a bunch of radio stores).

I was talking to a man who makes antennas. One of his customers bought one and put it in the attic, bending it every which way back on to itself, running next to the house wiring and all that. He pulled it out of the attic and shipped it back, saying it didn't work as well as the dipole he used to have about 40 feet up. This is a true story, so help me Sgt. Friday.

Bongo, Bongo. If all these hideaway antennas could work as well (or even close) to real antennas, there wouldn't be real antennas. We'd all run around with little sticks, bedsprings, garbage can lids, and the like.

MORAL OF THE STORY: If you go to the pet shop and buy a Chihuahua, it ain't going to get to ride in the back seat of a police car.

Guy I know runs a radio store. (Honest, some of my best friends run radio stores.) Guy tells me

(his name is Guy) that Harry Ham comes in the store and says the neighborhood he's moved into is so ritzy, they don't allow antennas of any kind. Harry is looking for an 80M antenna that will really get out but can't be seen. (Guy tells him about putting a tooth under his pillow.)

If anyone comes up with such antenna, please let me in on the deal for however much you want for 1% of the action. I don't care if you call it the Chewy Nougat antenna. Our follow-up product can be the anti-gravity machine.

There is also a Plak antenna. (I thought that was what you got if you didn't brush your teeth.) They are good for antennas, not wrapping around your yo-yo.

Old-timers should not laugh at Ned and Harry. A long time ago, the books all showed aerials running from the house to a tree in the backyard. Some thought you could not get an aerial without a tree because it was the tree that radiated. Big funny! Now the U.S. Army says trees *can* radiate! They also say the volunteer army is successful. So much for radiating trees.

Where were we? Oh yes — an exclusive neighborhood where antennas are not allowed. My 811-A bleeds for him. The area I live in? They invite amateurs to move in. The way this place looks, the antennas are an improvement!

(Kurt N. Sterba is obviously a nom de plume. Kurt said his true identity had to be protected as he works with a lot of hams. He doesn't want them coming up to him and saying, "I know more about antennas than you do" Such may be true but he comes cheap.) □

2

Kurt N. Sterba

Lo, pity the poor dummy load; it does a perfect job of doing what it's supposed to do, and it is called a dummy. Shame! (The Army, at least, is kind enough to call them "phantom antennas.")

Such a device, by whatever name you wish to

call it, is an excellent test instrument. Yes, a dummy load is an outstanding addition to the shack, far and above its obvious use of being able to tweak around without irritating other occupants of the band.

Are you having trouble with your rig or antenna? The dummy load can tell you the

answer. It is a substitute antenna; thus, you can isolate the trouble by the process of elimination. By substituting the perpetual 50-ohm characteristic of the resistors in a can, one can see if great changes in loading are necessary to go into the antenna. If such happens, it is obvious the antenna system is not 50 ohms and some steps have to be taken to get it back to its previous stage.

A dummy load can also be used for calibrating the noise bridge. In addition, some models have the potential for measuring the RF voltage present. With that information and the resistance of the load a constant, the exact power output of the transmitter can be measured.

A friend of yours offers to give you a batch of coax which he says was given to him by Uncle MARS. You are fearful that this batch was last used in Hawaii by the group that cracked the Purple Code prior to the Battle of Midway.

Here's how to check it out. Coming out of the transmitter is your wattmeter feeding the coax with the dummy load at the far end. Take the measurements. Then, put the wattmeter at the far end just before the dummy load. Read the power. The difference is what is being lost in the feedline. So there you have proof of the quality of the coax.

Back to the 50-ohm worship. If you are plagued by TVI and have used lowpass filters to help cure it, be aware of the fact that the effectiveness of the filter diminishes drastically as the load it sees moves away from 50 ohms; so it may be prudent to use a tuner after the filter. (You question using a tuner in a coax system? Don't laugh, this is straight scoop!) Yes, it is prudent because the tuner will give a good amount of harmonic suppression, and the filter always sees a 50-ohm load.

Such a combination may be a solution to a lot of problems. A trick done by some who are

plagued by living near ancient TV sets is to put one filter between the exciter and the amplifier, as well as one at the output of the amplifier.

With dummy load and noise bridge, one can look forward and backward through an antenna tuner (or matchbox) and find where the real 50-ohm settings are.

This would be a good place to say thanks to the many who wrote in about this column. Such is deeply appreciated and helps make up for the small remuneration received.

Really now, what does one do with five extra copies of *Worldradio*? After I send one copy to my mother and another to my non-ham (yuk) brother in Boston, I still have three copies of this great magazine left over. I figure any radio operator worth his salt already subscribes, so I shan't mail out the others. Maybe I'll buy one of those machines that rolls paper up and makes fireplace logs out of them.

But, as thanks to those who wrote in, here is something very interesting regarding the sloper. First, a sloper resembles half an inverted V. But all half-wavelength is on one side. It is fed in the center with coax as in classic dipole manner. It has a low angle of radiation and is directive in the direction of the wire. Usually, diagrams show the feedline going to the center with no great detail shown. I did see one in which the center conductor went to the bottom half. Nay, I say, nay.

Make sure the center conductor goes to the *TOP* half, with shield to the bottom. Then experiment with this: make the bottom half of the wire 5% longer than the top half. Will it make a difference, and how much? That is for you to find out. Do you want everything on a silver platter with no work on your part? Of course not!

It is also important that you use *nylon* (or some non-conductor) to tie off the ends. Do *NOT* use wire. □

To keep you, the reader, alert, eleven inconsistencies have been purposely included in this book. When you find one, you, too, can say, "Aha!"

3

Lil Paddle

I'm sure that seeing a woman's name on a technical column may start some teeth rattling among the more crusty curmudgeons of this audience. Before any of you misogynists go into apoplexy, let me point out that many of you two-letter types learned your CW at my knee.

During the era when the United States set out to *win* wars, I, as a civilian, was an instructor for the U.S. Army Signal Corps. I can't say at which base, for reasons that shall be revealed later.

I can copy code faster than Bill Eitel, am far to the right of Barry Goldwater and have climbed more towers than Bill Orr. (Lest you think I'm some sort of "Tugboat Annie," my boyfriend thinks I'm twice as pretty as Lenore Jensen.)

Let's get right down to some practical matters. I was talking to my oldest son the other night on 40M phone. (Although he runs a radio store, he is *terrible* on CW so I must go on phone to talk to him. It's awful to admit your own son is a lid, but that's the truth! The son from my second marriage turned out much better.)

Anyway, he was telling me about a customer who had accused him of selling a "no-good" antenna tuner. Upon questioning, it turned out the customer had some 75M nets he liked to check in to and stations told him his signal was weak. Seems his antenna was a 30 ft. piece of wire in the attic. Now lads, don't blame the poor little tuner in a case like that. You cannot make chicken salad out of chicken feathers.

If you are not at least a quarter-wavelength on the band you wish to work, you will suffer for the effort.

Another oft-neglected item is the maximum importance of the ground in any form of end-fed wire. And, yes, good grounds are hard to come by in apartments. Alas, the only solution for our cliff dweller may be banishment to the purgatory that is 2M.

Speaking of grounds, there is some totally unmitigated balderdash in the radio (they called it wireless when I was a little girl) literature concerning grounds. For example, "If you are running a very short, loaded vertical, the radials

do not have to be as long as usual." Rubbish! More than ever, you need all the length you can get. In fact, the longer you can make the radials, in all circumstances, the better it is. Make them as long as you possibly can; the angle of radiation will lower.

Going back to tuners, if you should doubt the quality of the power transfer, here is how to test. (Kurt, you forgot this when telling about dummy loads.) Run the power output of your rig through a wattmeter into a dummy load. Then hook the feedline to the coax input of the tuner. Take the single wire output and put that to the single wire post of the second tuner. Come out of the coax input of the second tuner, and go to the wattmeter, and then to the dummy load. Adjust the first tuner to see 50 ohms back into the transmitter, adjust the second tuner to see 50 ohms of the dummy load, and match between tuners. If there is any power loss, you would see it by subtracting the reading of the second meter from the first.

But enough about coax. If you really want a good signal, go *open-wire*. (I suppose I'm dating myself when I talk like that.)

My son also told me about a customer who was very angry with him for several days because the customer claimed the purchased antenna was defective. It was discovered later that the customer had a short at the coax connector. Well, no idiot ever shorted open-line! The moral of the story is: before you open your mouth, ohm your meter.

It is possible for open-line to open. Once a cute lieutenant I was seeing was sent on a free trip to the Caribbean, as the military station there was not being heard well at all, and the staff manning it couldn't figure out the problem. After examining things, the lieutenant found a break in the open-line to the antenna.

(Lil Paddle is not this columnist's real name, obviously. She works for a company whose policy is that all writing must be cleared through them. However, such transit time can be quite lengthy. She wants to write, is very near retirement and doesn't want to make waves.) □

4

Kurt N. Sterba

I'm very grateful for the nice letters that have been received regarding my humble efforts. Also received a criticism claiming that much espoused here was wrong and the writer's qualification saying so was, "I am an engineer."

What bothered me was that he didn't refute specific points with scientific evidence. As for being an engineer, I remember some years back sitting in a room when "engineers" argued that you could not beat a crystal oscillator against a variable oscillator as there would be too much noise in the output. (As you can see, I must be almost as old as ancient Lil Paddle.)

For many years the late Juan Trippe, of Pan Am, had to argue with "engineers" about making planes bigger. They kept telling him that airplanes were as big as they could ever be. He even had to get Charles Lindbergh to help him design one after "engineers" told him what he was trying to do was against the laws of physics. This battle continued through the ages up to and including the 747.

After the Russian Foxbat fighter fell into our hands, "engineers" were falling all over themselves laughing that the communications system still had tubes in it rather than transistors.

What they never realized was that the Russians knew that an atomic explosion many miles away would frazzle transistors but tubes would continue to play. When I listened to them laughing in unawareness I just sat there and wondered.

Then how 'bout the "engineers" who have come out with that overpriced disaster of a rig? One amateur recently purchased one, put it on his bench alongside the ICOM transceiver and the Drake transceiver, and after an evening of A-B-C switching to a common antenna, bundled it up and sold it to an unsuspecting buyer mesmerized by a once-revered name.

This is not to say that engineers are not honest. One working for the above-mentioned company is at least warning his friends away from it.

Speaking about rigs for a moment, I'm really getting tired of hearing amateurs prattle on

about Japanese radios hurting the U.S. economy. Think about this. . . if every single U.S. amateur active on the HF bands had bought a Japanese rig, all of that together would equal the check that Japan Air Lines writes for ONE airplane manufactured in Seattle, Washington.

For the apartment dweller, antennas and grounds can be a most perplexing problem. The ground can be non-existent or unreachable. Or, by following some misguided crusade to tie down somewhere, one may end up with a ground so long that the ground is radiating more than the antenna and Dan becomes Rather Not.

The wrath of your neighbors can also be accompanied by "hot mike." RF is all over the place. And RF that is there is not somewhere else, where it should be.

As my antenna guru told me, "Boy, look at how we did it in the '20s — counterpoise, boy." And he's right. Cut a quarter-wavelength wire for the band you are on and tie one end to the ground lug on the rig. Yes, I know you are wondering what to do with the 66 feet of wire you now have in your hands. Run it neatly around the baseboard, using insulated wire and wrap a lot of tape over the end because that is where the voltage is highest.

It is really amazing just what can be worked with mobile antennas indoors or mounted on condo balconies, etc. On 8 March 1981, I worked two DX continents within five minutes with an 8-foot wire draped around inside for an antenna on 10-meter SSB, running barefoot power. Fun.

One English group has a contest limiting antenna height to no more than 25 feet and the length to a maximum of 135 feet. And you have to go QRP to boot. Under those conditions, one might need the patience of Job.

One old trick, which may be new to many is: if you are having restrictive antenna problems, leave the mobile antenna on your car and run coax to your station in the house when you wish to operate.

Speaking of verticals, there was a recent statement in an amateur publication with which I differ slightly. The statement was that a ground-

mounted vertical worked best. I would not say the fine gentleman who made it is wrong; all I would say is that you should try it for yourself.

It is my belief that you should get your vertical antenna as high up as possible. You may find that your vertical atop the TV mast on your house may prove to be a real tiger.

Here's the semi-logic behind such a statement. First, unless you have a great radial system, ground loss is terrible. The higher the antenna moves the less important the radials become. Now let us digress for a moment and examine exactly why the vertical is supposed to have this magical and sought after "low angle of radiation."

Picture, if you will, your everyday center-fed dipole. Wire runs east and west, radiation maximum is north and south through the middle of the wire. You see in your mind the main lobe of radiation at a 90° angle to the wire.

O.K., now we are going to, javelin-like, shove this antenna into the ground exactly half-way. Thus, we have a quarter-wave vertical showing. (Note: that is for illustration purpose only; there is no wire in the ground, but we'll get to that in a minute.)

That main lobe of radiation is now still 90° off from the antenna and now hugging the ground. Therein lies the benefit and the problem of verticals.

Ah yes, lower angle of radiation means fewer bounces off the ionosphere to get to somewhere far away. Beautiful, if this great antenna is sitting on a sheet of copper 100 wavelengths long in the middle of Utah somewhere.

You may have noticed some books referring to the Earth under the vertical as an "image" antenna. Well, pull the radials off and see what happens — you have a "mirage" antenna.

Now to the problem of the ground-mounted backyard antenna. The low angle of radiation is a blessing and, as you shall see here, a curse. Here it comes taking off at that "low angle" — SPLAT right into your washer and dryer, and SLURP into the grounding. The car in the garage gets some; the house wiring gets some more; your neighbor's garage filled with drill presses and his lathe gets some. On the other side of you the model train rails get their share; that house with aluminum siding across the alley from you has just killed your chances of going to Europe. Your

kids are wondering why the lights in their room are blinking on and off.

Some people insist on saying that a vertical radiates equally poorly in all directions. Not true. It radiates wonderfully in all directions. It must be radiating — you just got into three TV sets, two stereos, and an electric organ.

Get the thing up in the air away from all this ground clutter. You will *still* have a cherished low angle of radiation. You are still working with the main radiation at a 90° angle to the wire. Actually, getting it up higher will lower the angle even further. You will also get some other higher angle lobes which will make working closer easier.

You still have the problem associated with verticals being noisier than horizontal antennas and no front-to-anything rejection.

If this is a pressing problem at your QTH, you may enjoy experimenting with receive loops which can be very directive and low noise.

A different article in another publication had the writer "gee whizzing" because he found the half-sloper worked better than the full sloper. (Pause for definitions: A full sloper is a half-wave dipole, center-fed, with one end fastened to a tower and the other end near the ground. You can visualize it at about a 45° angle. The half sloper has a quarter-wavelength of wire coming off the tower fed by the center conductor with the shield side going to the tower.) Of course it will work better. The high current part (center) is at least twice as high as it was before.

The center of a dipole is all important. That is where it all happens. When putting one up, avoid like the plague those silly diagrams where people use broken bottles or whatever for the center of the antenna and then wrap on globs of tape to keep it out of the water. Tacky.

Spend a few dollars and get a professional connector, such as one made by Budwig, Van Gorden and Palomar, to name a few manufacturers.

Amazing how some people can spend hundreds, if not thousands, of dollars on RF generating equipment and then pour it all into some mess of who-knows-what impedance.

That's like putting on your tuxedo and having holes in your shoes.

Your comments, questions and literate arguments are most welcome.

5

Kurt N. Sterba

The editor of this fine journal received a letter chastising him for having an “unsigned” writer in the newspaper. The person writing in felt that “anonymous” authors were not very credible and all that. I’d be the first to agree. However, I’m too old to accept the agitation from argumentative telephone calls and I’d like to walk around Dayton in peace.

If you think being a columnist is a big bowl of cherries, you’re wrong. For example, one other columnist was sent a letter in which a very foul comment was made about “Lil Paddle.” The letter writer mentioned having been a radio officer in the Navy. All I can say to him is that Congress may have made you an officer, but you missed out on the gentleman part.

The Navy — big deal. Those are the guys who got their frequencies so balled up that ships in the Atlantic wanting to talk to each other ended up talking to the ships in the Pacific!

Here’s one experience with our Navy. I had gone through a waist-deep swamp, spent the night in a rice paddy and then ended up on an aircraft carrier. My gold leaf status got me into the officers’ dining room where some freshface asked me if I had a clean uniform. (One thing about groundpounders — they have their feet on the ground.) I thought about replying that my valet would be bringing my wall locker aboard shortly but figured, why bother?

I’ve got to give the Navy one thing though — they live well. The coffee came out of a service that would have done justice to “the governor’s wife poured” in the society column. The only thing wrong was the pourer. He was a DU. That was about all the Navy could find for DUs to do. On the other hand, I once served under a DU

captain who was the epitome of soldier, patriot and American. He could also throw a hand grenade farther and more accurately than anyone I had ever seen. Good thing he hadn’t gone into our Navy.

One letter we received bemoaning poor results gave the antenna dimensions. They were off a great deal. Here is a way to check your math calculations; or possibly your calculator got a glitch or something. The length of a half-wave antenna is 468 divided by the frequency in MHz. Then you cut that dimension in half for each side of the antenna.

Here’s another way to check your work. Divide the number 300 by your frequency in meters. Take that figure and divide it in half. There you have a half-wave in meters. Multiply that by .95 (Note: that is *point* 95.) Multiply what you have now by 39.37 (Note: that is 39 *point* 37.) Take your answer and divide by 12. There you have a half-wave antenna, in feet. Remember if the answer is 32.95, that is not 9-1/2 inches; but rather 11 inches plus 6/16.

Here’s a little tip that doesn’t seem to get much notice lately. If you have a dipole up on 40 meters, just go ahead and use it on 15 as is, and forget whatever SWR you get. It will work out just fine.

Also, if you resurrect the Windom, remember that a good ground connection is an absolute must; do your math work from both sides to insure accuracy. For example, if the connection is supposed to be .36 from one end, do your math and then to check your work, do it .64 from the other end. Then check to see if you are .14 from the center. It is better to be safe than sorry.

As I write this column, Field Day is practically upon us, and many groups will run to the highest mountain. They will wonder why groups down in the valley beat them out. Easy answer.

Mountaintops are terrible for HF. Chairman Kurt gives you this bit of reasoning. If mountaintops were so good for HF, the Voice of America would be on the top of Mt. Whitney. Instead, look where they are.

One on the East Coast is located where tobacco is grown; another on the West Coast is where they grow grapes. Those antennas are on nice rich, moist agricultural soil — not up on some rocky, dry, lossy ground. Take heed.

If you should have any questions, comments, etc., consider yourself invited.

In closing, I offer you the story of the humble bumblebee. The engineers say the bumblebee should not be able to fly. Its dimensions are all wrong. However, the little insect pays no attention and keeps on flying.

(Obviously, Kurt N. Sterba is an alias. We must honor his request as he wishes to protect his privacy. As he puts it, "Let them pick on Judge Glanzer." When Woodward and Bernstein tell who "Deep Throat" was, so will we.) □

6

Lil Paddle

If I weren't such a genteel lady I'd emit a string of curses. What drives me to such a state of anger is a book which shows a total abdication of responsibility to its purchasers.

This travesty is titled *A Guide to Ham Radio* published by 73 at the price of \$4.95. For example, on page seven we're told that a radio wave with a frequency of 660 kHz has a wavelength of 200 metres.

Obviously, no one knowing one whit about wireless proofread that page. I dread that this "book" should fall in the hands of any beginner.

In truth, a signal at 660 kHz has a wavelength of 454.54 metres. Here is the formula: If you divide Frequency in MHz into 300, you get Metres. If you divide Metres into 300, you get Frequency in MHz.

On page nine the unfortunate reader is told "High frequency, small wavelength waves go through the ionosphere into space." Page eight relates, "High frequency, small wavelength signals are usually confined to line-of-sight communications." (This book should be recalled from the dealers' shelves.)

In actuality, it is the Very High Frequency (VHF) waves that are line-of-sight. The high frequency (HF) waves carom off the ionosphere and go around our planet.

It is obvious from the "See Spot run" writing of this disaster that the intended audience was every newcomer to Amateur Radio between the ages of 6 and 9. Yet, the diagram of a vertical shows one solitary wire running to the vertical element and nothing at all going to the radials. The inverted V diagram shows coax coming from the feedpoint to the ground where the shield goes to the earth and a single wire comes out of the coax to the transmitter.

Page 35 shows a little wire coming out a window and hanging down along the wall of the house. The caption says that this "works well." Works well compared to what, no antenna at all? My heart bleeds for the new Novice depending on this lash-up to make contacts. (And no mention is made of wrapping tape around the end.)

Then page 36 proclaims this: "A quarter-wave vertical used for 15-metre operation is under 4 metres long, or about 7-1/2 feet."

Sorry, a quarter-wave vertical for 15 metres is about 11 feet long. The formula is 234 divided by frequency in MHz. What manner of publisher would inflict such rubbish on the unsuspecting?

References are made to Field Day being a "DXpedition", and identifying your station as being in "Maritime Mobile region 5" (?). One is told you must retune each time you change frequencies and that tuning up takes "30-45 seconds."

Does the author have stock in the tube companies? The book is a skimpy 47 pages for \$4.95. Possibly a blessing, because if it were twice as big it could have twice the misinformation. It's kind of like the saying, "Thank goodness we don't get all the government we're being charged for."

I wish that, after seeing this monstrous book being foisted off on the neophytes, Chairman Kurt would stop reminiscing about his steel pot days and making dumb jokes and come out with an antenna book that would do some people some good.

While this column is supposed to be about aerials and it was on that basis we were critical of *A Guide to Ham Radio*, there is another statement that must be cleared up. On page 42 it is stated: "100 watts of power is quite a bit for a car battery to handle."

Unfortunately, many amateurs think that a 100-watt transmitter draws 100 watts when transmitting. First of all, with modern transceivers, 100 watts means 100 watts **output**. The power drawn from the battery is over 200 watts, but this is only on voice **peaks**, which happen a very small percentage of the time. Also, while you press the mike button, you are actually speaking only half of the time or less. Then the amount of power drawn or transmitted is proportional to the volume of your voice. Since every syllable you utter is **not** at peak power, the average power transmitted is well below 100 watts.

What this all boils down to is that you can run a 100-watt transmitter all weekend on a decent size car battery. Then think about this — you could decrease your drain by half (giving twice the battery life) and lose but 3dB.

Which brings us to the topic of this month's column — dBs. They seem to be thrown around a lot with not much understanding as to what they really represent. Example: You are listening on headphones to a single frequency tone, and the conductor of the test tells you to indicate when you can detect it is louder. The volume is cranked up and you put up your hand. The level of increase finally detected as "louder" is, for most people, 1dB.

This illustrates that under almost laboratory conditions, a 1dB increase represents but a fine sliver of perceived difference. Under normal wireless conditions, a 1dB increase would never be noticed. Would it be noticed on an "S" meter?

No!

What magical powers many attribute to the S-meter on their receiver! If such a condition were true, it would require an instrument more expensive than the transceiver. S-meters have no standard. And if one were calibrated for one band, it would change drastically for other bands. At one time it was bandied about that one S-unit was a difference of 6dB. Some manufacturers claimed but five. Six would have been a nice standard, since that would have made it a four time power increase from S-unit to S-unit.

For you see, a 3dB increase necessitates a double in power. Then to raise another 3dB, you would have to double your power again. To illustrate (assuming all things are ideal), to raise one S-unit on the other station's receiver you would have to go from 100 to 400 watts. Another example: If you were running 1,000 watts and decreased your power to 250 watts, you would drop 6dB or but one S-unit. If you were running 500 watts and you went to 50 watts you'd drop 10dB or about an S-unit and a half on our perfect S-meter.

To prove that S-meters are not what they are cracked up to be, here is the proof. How many times have you heard amateurs on the bands checking their amplifier versus transceiver alone? When going from 100 watts to 1,000 watts, the gain would be 10dB. Yet, you'll hear reports like, "You went from S-7 to 20 over 9." Or you may hear, "You sound louder but there's no difference on the S-meter." And thus we demolish the myth of the S-meter.

As far as microvolts per dollar goes, you'll do better putting the money into the antenna system before adding an amplifier. Not only does the antenna give you transmitted gain (without increasing the power bill), but it also increases the received signal the same amount. Plus, it gives great rejection off the back and even more off the ends, reducing the QRM on the frequency that you hear. And it helps others, as you are squirting the power in the given direction you wish rather than having it just spew all over.

As to the type of beam antenna to put up. . . if you are torn between a quad and a Yagi and someone tells you the Yagi is better, you know you are in the company of a buffoon.

There are certain mechanical superiorities of the Yagi under adverse weather conditions, but as far as just oomph per element or boom length, the quad is the winner.

To touch on something else, In order to make the received audio somewhat more pleasant, you may wish to obtain an external speaker of higher quality than comes in your rig. Try two of them separated a bit. It does make it much nicer than listening to a tinny speaker in a tinny box.

Now we go back to yesteryear for true creativity in antennas. I remember one cute lieutenant I used to see before he shipped out to the CBI theater. He wrote me from New Delhi, Bangkok, Singapore and then we just lost touch. He was from Fresno, California as I remember. He told me that once they couldn't get through on a circuit. So what he did was drag some of that metallic matting used on airstrips over next to a metal building. There was now a 90 degree angle of mat and building. By putting up a dipole at the right place, he had created an HF corner reflector

which worked out just fine and a good communications path was created. Not only was he smart, but he was a handsome brute. I hope the years have treated him as kindly as they have me.

Then to the reprobates who have written in challenging what we've been saying in this column: You are full of soup!! After you read next month's column by my alternate, you will realise what twits you are.

To others: your queries, comments and praise are welcomed.

(Obviously, Lil Paddle is an alias. Due to her work situation, it is necessary. She would like to point out that she is an old-fashioned gal who likes the door opened for her, her cigarettes to be lit and her dinner paid for.) □

7

Kurt N. Sterba

The author of a book published by a major company made a cruel cut. He referred to cutting feedline lengths as some sort of CB nonsense.

Well, the laugh may be on the big ham guys. What may have happened is that the CBers got together, pooled their money and sent one of their good buddies to college.

Between classes in Advanced Truck Driving, he was in the cafeteria and while looking over the shoulder of someone reading a book saw this: "The impedance at the input (transmitter) will be the same as the load (antenna) if the line is exactly a half-wavelength long, no matter what the impedance of the line itself."

What this says is that a half-wavelength line will "mirror" at the bottom what it sees at the top.

Now, logic should tell you that if the engineering tomes make a big point of this property of the half-wave line, that a length NOT a half-wave will NOT do that. Right?

WARNING: When we speak of the half-wave lines (and multiples thereof), that takes into

consideration the velocity factor of the line; so in reality the physical length of a half-wave line will be shorter than that of a free space half-wave.

While one could use the published velocity factor for the different types of coax and cut lines that way, it would be far preferable to use a noise bridge and know you are right on the button.

Lengths of feedlines do have special features. For example, if you had a 100 ohm antenna and a 50 ohm feedline, a quarter-wavelength of 75 ohm feedline at the antenna would act as a matching transformer. If you had a 36 ohm antenna and a 75 ohm feedline, a quarter-wavelength of 50 ohm line would act as a matching transformer.

Let's go back to the original premise. The magic of the half-wave line is that no matter what impedance it should be itself, it will show at the bottom what it is seeing at the top. (And that is true for multiples of half-wave.)

The first step is really to know what impedance the antenna actually is. Then the noise bridge can tell you whether the antenna is short (capacitive reactance) or long (inductive reactance). If this column has made any contribution to your knowledge or antenna system

improvement, this is it. I can assure you this is true, and I caution you against listening to anyone who speaks to the contrary.

And yes, the noise bridge is a most invaluable station accessory. If the price of an item not used every day should cause you to balk, get together with some pals, buy one and take turns using it.

Next, SWR is caused by the mismatch between the antenna and the feedline. Nothing you can do, no matter what knobs you twist at the station end will change the condition existing at the feedpoint. Period.

Here's an example of false economy: replacing a three-element Yagi with a four-element Yagi, using cheap coax. You just threw away the gain of the extra element. Use the best coax you can afford. Oddly enough, the more loss there is in coax the more distorted readings become regarding SWR. Crummy coax can tell you things are just fine when they are indeed rotten.

It also bears repeating that the chart lengths for antennas are only starting points and you should expect to prune or add to the length.

I wonder how much confusion a phrase on page 58 of an antenna book by a famous writer caused. There it was stated that the electrical length of lines was always shorter than the physical length. NOT SO! The physical length (which you would measure with a yardstick) will be shorter than the electrical EFFECT obtained by that line.

Here is the true story. To obtain the electrical properties of a quarter or a half-wave line, the actual physical dimension of the cable will be shorter. It will be shorter by the percentage as expressed by the velocity factor so noted in the literature about the particular cable under consideration.

Now let's put you to work. If you've found any mistakes in books on antennas, help others by alerting them. You may have spotted errors and avoided problems because of your experience; a newcomer may not be so lucky. He may be struggling with his 107-foot antenna (as we saw in our book) on 80-meter CW. Send in your finds.

Your pet theory and technique will find a place on these pages; your questions will be answered. If I don't know the answer, I'll check with someone who does.

(Invitations to duels at sunrise with coconut cream pies at 10 paces will be ignored.)

Before signing off, let's finally do away with some often heard but not trues. While cross-polarization can really hurt at VHF frequencies (that is, one antenna vertical and the other end having horizontal antenna), it matters not at HF. The signals just turn, twist and jumble around. When you hear someone say the signal came in better on a vertical or a horizontal, it is probably due to the angle of the signal coming in rather than the polarization.

Some books say that on a wire antenna, end fed, the radiation main lobe will be in the direction of the wire. Not so until the wire becomes several wavelengths long. Putting up a short long-wire antenna may see the main lobe at 90 degrees to the wire or a not-so-short going out at 45 degrees.

May your load always be resistive.

(Needless to say, Kurt N. Sterba is a made up name. He must remain anonymous for the protection of himself and the public. When people disagree with him he becomes violent. As he put it, "When I get to Phoenix, and you're there, argue with Lew McCoy instead.") □

8

Lil Paddle

First of all, I would like to extend my gratitude to those who have been so kind as to write in with kind words regarding these dispatches. Gentlemen, I thank you.

Now to some problem solving. A query came in from an amateur who lives on the 12th floor of a condominium in Riviera Beach, Florida. He has 17 feet of horizontal space. What, he asks, is there to use other than mobile antennas?

Being on the 12th floor may be your salvation.

One trick is to slip a wire through a length of PVC pipe which holds the wire away from the outer wall of the building. Tie a fishing weight (sinker) to hold down the bottom end. The wire will have to be at least a quarter-wavelength long on the frequency being used. This antenna must go into an antenna tuner which then goes to the rig. Obviously, this will probably be a nighttime utilization. A good ground system, say to the cold water pipes or quarter-wave wire strapped to the ground post, will be necessary. There is always the possibility of finding some wire the exact colour of the wall of the building and sneaking by on daytime use. (Paint the fishing weight.)

If you can find some accomplices among other residents on the same floor, a horizontal wire could be used. But let us now consider having to keep everything indoors.

You mentioned you had 17 feet of horizontal space. Such is a bit over a quarter-wave for 20 metres. Starting where the walls meet you could have half of a dipole run along one wall and the other half run along the other wall, and then bend it down to make up the difference.

Depending on the aesthetic factors involved you could start in the very middle of the room, tape the dipole to the ceiling, run the wires to the corners, and then bring the wires down to the floor and along the walls.

Since in your situation it seems every dB will be precious, you might try using a loop antenna a quarter-wavelength on a side along the floor and ceiling and walls. It would look like a one-element quad. Then you could put another element on the opposite wall — say five percent longer — to act as the reflector. Thus you have a two-element quad for the higher frequencies.

Getting really ingenious, you could come up with a stub arrangement that would have the undriven element vary from 5 percent longer to 5 percent shorter, and it would then act as a director and you would be directive in the opposite direction. (Just think about it; you could sit around the club meetings and boast about your two-element quad up 100 feet!)

The results on 10 and 15 could well surprise you. Or you could turn it around and, not depending on the walls, put up, say, 8-foot loops

supported by nylon fishing line tied to picture hanging pins, a four-element quad facing out in the direction of a window (if that fits the dimensions of the room). You will now have a great signal someplace in the world.

One solution may be the loop antenna similar to those you saw on broadcast radio receivers many years ago. While not very efficient, they do work better than one would think and were the favorite for clandestine service for many years. You will need a tuner that works with balanced feedlines.

Another thing to try for the lower bands would be a very thin wire running to a tree somewhere (if such exists). It may never be noticed. Check it daily because if a bird flies into it, it breaks.

You didn't mention how many floors there are above you in the building. If the manager or the maintenance people don't go on the roof very often, possibly you could paint some of that very thin coax the same color as the wall and run it up to something on the roof. If they do ever find your vertical up there you could say, "It's been up there for six months now, who did it hurt?" Sometimes less than the truth is the best defence.

To digress, when we speak of long thin wire, we're referring to enamel-covered wire. Possibly 12 stories up, with cooperating neighbors, balconies, and if the colour of the wall is right, plastic-covered wire of the right colour would never be seen. (This would be in a dipole configuration.)

Do not give up hope. Look at it this way. If the QRPp zealots can make contacts with a good antenna and no power, you should be able to do well with power and no antenna. An amplifier or a speech processor may be needed to give you the lift needed. All will depend on the absorption offered by the building you are in.

If all else fails, there is 2 metres.

(Lil Paddle is an assumed name [no kidding?]. She's been around radio so long that if someone mentions Don Wallace, she replies, "Oh, you mean 'the kid'." After a few sherries, she harks back to the days when "we had wooden radios and steel men.") □

9

Kurt N. Sterba

Please know that I enjoy hearing from you. Most of all I like QSL cards from “K” call two-letter licensees with nice words to say about this column. Then I’m pleased to answer questions from the newer amateurs. Please allow time for your query to be forwarded to me and my answer to be sent back to Sacramento before it is sent back to you.

What is a waste of your time and good paper and postage stamps is you writing in to disagree with me.

What makes you look very silly is to take me to task (you think) for something I’ve said and then write to *Worldradio* saying, “Too bad you don’t have somebody like Harry Hooten writing for you; he knew what he was talking about.”

I’ve been told to read Bill Orr, to read Maxwell, etc. What brings such rockets my way are my statements regarding a “proper” length of coax cable between the transmitter and the antenna.

First of all, for Harry Hooten devotees, I quote from page 93 of his *Amateur Radio Antennas*, published by Howard W. Sams & Co.: “Amateurs frequently place an SWR bridge at random points in a coaxial line and adjust the antenna for a low SWR. . . measurements obtained in this manner are usually worthless; almost invariably, the line SWR is excessive when measured according to standard engineering procedures. The SWR bridge or other impedance-measuring device should be placed either at the antenna feedpoint or at a half-wave multiple of the line.”

The IMPEDANCE changes along the line NOT THE SWR! Hooten is wrong, because SWR remains constant everywhere on the line, except for a gradual reduction from the load to the input end due to line attenuation. However, the SWR will change as the line length is changed if there is no balun, or if the balun is not functioning properly. (Ed., Maxwell, W2DU, see *REFLECTIONS — Transmission Lines and Antennas*.)

Looking at page 25.9 of one edition of the respected *Radio Handbook* edited by Bill Orr and published by Howard W. Sams, we find this:

“The input impedance of the line depends not only on the load impedance at the far end of the line but also on the electrical length of the transmission line.”

Lest anyone think this is some newfangled idea or passing fad, we go back to 1959 and look on page 10.12 of a book issued by the Collins Radio Company, *Fundamentals of SSB*. “The impedance presented to the transmitter depends on the terminating impedance and the feedline length.”

What does the *ARRL Antenna Book* have to say on the subject? Page 76: “The input impedance, or the impedance seen when “looking into” a length of line, is dependent upon the SWR, the length of the line, and the Z_0 of the line.”

Now, if you have any argument about all that, please argue with them, not me.

Let’s take a look at something quite interesting. What is the property of a quarter-wavelength line? Let’s say you had a 300 ohm antenna and put a quarter-wave line (don’t forget the velocity factor) of 72 ohm cable on it. What would you see at the end of the cable? Answer: 17 ohms.

Let’s take the same 300 ohm antenna and use 50 ohm cable. Answer: 8 ohms. Thus we see that a certain length of coax will have properties of its own. And the same holds true for ODD multiples of that length.”

Suppose you cut a random length of coax and, by chance, it drops pretty close to a certain length. This is what could happen — off the resonant frequency the antenna is 25 ohms, and the transmitter is now looking into 207 ohms.

Here is how we came to that. Assuming 72 ohm cable — 72 times 72 equals 5184 divided by 25 comes to 207.

Here is how we can avoid oddities and really know what is happening.

Looking into the manual that comes with the Palomar R-X Noise Bridge, on page 3 it says, “If the feedline is an electrical half-wave long, or some multiple of a half-wave, the readings taken at the end of the feedline are exactly the same as though they were taken at the antenna.”

Now, isn’t it nice to start somewhere? Here we

have a point to work from, if desired.

For a discussion of all this, I'd recommend the material found on pages 41 to 44 of *Beam Antenna Handbook* by Bill Orr and published by Radio Publications of Wilton, Connecticut.

Now, what do the English think about all this? They've been working with the field for a long time. In the section on HF Aerials in the *RSGB Handbook* (after some beating around the bush and qualifications), they say, "The adjustment of line length may result in the presentation to the transmitter of a more acceptable load impedance so that it delivers more power. . . ."

What else do they say? "For a greater percentage change in frequency, there will be a greater variation of input impedance the longer the physical length of line."

If you'd like the rest of the story, the book is available from the Ham Radio Magazine bookstore.

There is a good reason for buying all these books on antennas. It is so you do not embarrass yourself when writing to Doug DeMaw. Really now — people running the half sloper up a tree or wooden mast, finding nothing to ground the shield side to, so they just left it unconnected to anything! Then they wrote in to complain that it didn't work!! (See page 31, *QST*, October 1981.)

I suspect that those were unsigned letters written by pals of DeMaw's knowing full well that when he read them he'd just go sputter, sputter. They probably were laughing with glee when they wrote them, chortling all the way,

wishing they could see the look on his face when he read them.

On that tack, here's a little tip. Many hams, when traveling, will take the 2-meter rig out of their car and use it in the motel room. The antenna may be the classic "wire coat hanger cut to 19 inches" and soldered into a coax connector. They expect the chassis of the rig to be the ground. Wishful thinking.

Take 19 inches of wire (and a bit more for the wrap) and attach it to the barrel connector. Now you have a whole antenna instead of half an antenna. Watch the radiation increase greatly. This should also be quite useful for those who just run a rubber duck into the antenna receptacle. Just let the added wire hang down. Now you have a vertical dipole. Much better.

Speaking of 2 meters — when at the hamfest, do you look at the Heath Twoers with nostalgia?

Next month we'll have a special tip for whose interest is weak signal reception on HF CW. Which reminds me — wouldn't you agree that the biggest improvement in the magazine has been the *QST* DX column since Ellen White took it over?

(Kurt N. Sterba is an alias [really?]. He insists on such because he does not want to run into the people on the air who call him asinine and stupid in letters. This mature gentleman, urbane and erudite, has but one answer for such people: "I'm made of rubber and you're made of glue. Whatever you say bounces off me and sticks on you.") □

10

Kurt N. Sterba

Hams in California have an advantage over those of us who live in other parts of the country. Many of them work for very scientific companies — Eimac, Hewlett-Packard, Hughes, JPL, Lockheed, Raytheon, etc. They get to take a lot of fancy test equipment home with them. They take antennas very seriously out there.

Armed with time domain reflectometers, they

squeeze every last dB out of their Yagis and quads. Who ever said that one dB doesn't make a difference? Why, didn't you hear all those BIG signals coming out of California during the CQ WW SSB contest? You know they were that loud because they really had peaked up those antennas so much better than the rest of us. That's the only reason I could think of, and I'm sure that is the only reason you could think of, too.

Into the mailbag: one of our readers disagreed

with our judgment on the Zepp antenna, and in the spirit of the Fairness Doctrine we grant him more than equal space or equal time for his most eloquent defense.

The Zepp is an excellent voltage-fed antenna which can be analyzed easily by mathematical methods. It operates well at all frequencies above its self-resonant frequency when used with tuned feeders, and exhibits exactly the same pattern and impedance characteristics as other long-wire types. At all frequencies above its resonant frequency, it exhibits gain over a dipole. When used with a proper matching stub and non-resonant line (half-wave shorted stub at the operating frequency), it is an excellent single-frequency device with about a 5 percent bandwidth capability. It has been used by tens of thousands of amateurs, and indeed one is still in use at my QTH for 40 and 80. I worked some 60-odd counties with one before WWII, using 100 watts of hard-earned RF on 40, 20 and 10, and later used to work ON4AU on schedule on 80 meters with a 360-foot-long Zepp. During the last CQ DX CW contest, I garnered 166,000 points with 5 watts on 80, 40, 20, 15 and 10 with this antenna.

OK, and as Voltaire said. . . Seriously, we certainly welcome your input on how to improve the output of radiated energy. If you have a pet antenna, a technique, a theory, an argument, you will get a chance to climb up on the soapbox here.

For a moment we'll leave the antenna proper to talk about putting power into it. Signals would be much cleaner on the air if more amateurs would follow this procedure: When tuning up your rig with the key down, run power up until you reach the peak and then back it off to where the needle falls off just a bit. The "needle" could be on the rig's meter or an external SWR bridge or watt-meter.

This is also applicable to linear amplifiers. Let's say that your amplifier peaks out at 600 watts output. (That is all you should expect at 1,000 watts input.) Back the drive down to where you are putting out only 500. First, you will by far lessen the chance of distortion, splatter, buck-shot, etc. Your tube life will be extended, the power bill will drop a bit, and the station on the other end will never hear the difference.

Considering that you would have to go to 1,000 watts output to see a 3dB increase at the other end

(from 500 output), you can see just what insignificance 100 watts or so is at those power levels. To put it another way, if it takes 500 watts to move up half an S-unit, or 250 watts for one-quarter of an S-unit, what matters 100 watts?

Backing the power down may be one of the few things you can do to "get something for nothing." At the price of big bottles these days, you should give them all the nursing you can.

One of the biggest bargains around is the big Johnson kW matchbox. If you can latch on to one at a decent price (haunt those garage sales and flea markets!), you have a real prize. A tuner, even in the coax-to-coax systems, can really squash harmonics. Plus, the closer the match your TVI filter sees, the better it will operate.

Back to the radiators. Word is spreading fast about how good the Butternut vertical is. It's built on quite a different principle than what is usually associated with shortened antennas. The difference is apparent where it counts — at the other end.

Very interesting article on page 60 of the July 1981 issue of *Ham Radio Magazine*. It's about the W8JK antenna and has lots of food for thought. Points out that such is a good antenna for those who cannot get their antenna up very high.

Many amateurs do not put up a dipole for 80/75 because it won't fit on their lot. Since that band can be a lot of fun, it's a pity to miss it when the solution is so simple.

In the center-fed half-wave dipole, after you get out about an eighth-wave from either side, you can do all kinds of things with the wire and not see a great deal of deterioration.

You can hang the remaining part down, go sideways, whatever, including winding it up if you wish.

For example, Vanguard makes a long insulator that has grooves. Neatly you could wind up some of the wire in that. A rule of thumb is that it takes about 10 feet wrapped up to equal 5 feet strung out. Run the coiled-up part of the antenna out as far as you can towards the end. After the coil, hang about 2 more feet so as to have something to get the fine trim on.

Don't forget to have a coil in each leg and even-stein lengths on both sides of the center. This same idea can be used on 40, or 160, or wherever you want to get more antenna into less space.

Restricted area antennas can be a real challenge in these days of mobile homes, condos and

pesky laws in neighborhoods. Since many amateurs face such problems, any input you have regarding solutions would find an eager audience.

There is a book on the market about antennas for apartments. Have any of you read this book? If so, write and tell us what you think about it.

The alternate conductor of this column will lend her illuminating presence next month.

Thanks to the QRPer who wrote in. Any questions will be answered. The answers will be correct.

*(The author of this column goes by the Mark Twain of Kurt N. Sterba to protect his mailbox from chaff. The window to his QTH can be reached through **Worldradio**. They will forward the mail.)* □

11

Lil Paddle

Kurt, you are a spineless jellyfish! In the September issue of this periodical you told the truth about the Zepp. Then in the January edition you carried a defence of the Zepp in your column, and you said nothing. You let me down!

As it says in the *RSGB Handbook*, "Put bluntly, it usually does not work." Then in *Amateur Radio Techniques*, edited by the respected Pat Hawker, G3VA, we read "Exit the Zepp?" which says, "Although the Zepp in its simplest form is still featured in almost every handbook, words of warning were published in the *RSGB Bulletin* as long ago as December 1955." On another page is this phrase, "by means of the rather dubious unbalanced Zepp feeder arrangement."

Now I tell you Kurt, we Brits know our aerials. Let me remind you it was the Yanks who came to England to study RADAR in 1941 and not the other way around.

All those baby-faced 2nd lieutenants of yours; I think that if they had been asked to spell RADAR backwards in a crossword puzzle, half of them would have muffed it.

As it was, some of them didn't bathe often enough and were sent to man the remote sites in Scotland.

So when I say something is so, it is so, and I expect you to go to bat for me in your column — not just tuck your tail between your legs.

I had great hopes for you. I thought it might be you who could come out with a good book on the subject. Heaven knows the newcomers need one. Look what they have to put up with. I quote from

a book printed in 1981 by Prentice-Hall, "Amateurs have made these calculations a million times when trying to set up dipole or quarter-wavelength antennas for various frequencies.

Wavelength in metres	Frequency in MHz
85.7143	3.5
42.8571	7
21.4286	14
10.7143	28
5.35714	56

Now I pity the poor beginner searching for this bloody 56 MHz band. That frequency is Channel 2 of the telly!

Can you imagine, yet believe that the book was written by a Ph.D.? The twit leaves *out* the 15-metre band (21 MHz) and puts in a totally non-existent band. Where has he been? That was the old 5-metre band which ceased to exist as of 40 years ago.

Then this flaming genius tells us that "At 28 MHz, a wavelength in free space is 32.65 feet." (It is 35.15 feet.)

A major publishing house lets this get by them, "Wire lengths will be longer than the free-space length for the frequency of operation." Good grief! The exact opposite is true. What was his doctorate in — goldfish?

The Scelbi Publications book, *Practical Antennas for the Radio Amateur*, is very good in most respects, but it shows one-element antennas with different size front and back lobes; long-wire antennas with the feedline connected to the

wrong side of the insulator; formulas showing how to compute the length of an antenna but does not tell if the answer is in inches, feet, metres or what; calls rotator cable “TV ribbon wire,” and so forth. But as it stands, it is probably the best book for the beginner.

But let us move on to something constructive. I heard a couple of chaps talking, and one said he was going to make a real effort to work DXCC on 80 metres. The other ham suggested a vertical to get the long throw needed. The first one pooh-poohed the vertical and said he was going to put his dipole up at 70 feet.

Now, let us look at that. An 80-metre antenna up 70 feet has the same angle of radiation as a 20-metre antenna at 17 feet. And that, it is my sad duty to relate, is 90 degrees, which is. . . straight up — and straight down. Antennas a quarter-wavelength above ground are referred to as worm-warmers.

For DX you need a low angle of radiation, and a vertical does give you that. Just shunt-feed your tower, old boy, and you’ll be there. The bad words mouthed about verticals are spoken by people who did not have adequate radial systems. It would be quite impossible to overemphasize the importance of the radial system.

The more wire, chicken screen, metal — whatever you can get on the ground — the better. Considering the frequency involved, you might take a page from the book of the medium-wave broadcasters who use verticals. They run radials out for a half-wavelength.

Since most of us don’t have gardens of that size, you could run the radial wire as far as possible and then go along the base of the fence, zig-zagging it around. If your wives don’t care for wires running over their geraniums, do this: Coil the radials up on a roll and unroll them on those special 80-metre nights and roll them up the next morning. If you have a metal sprinkler system, chain-link fence, camper in the garage, whatever, tie to it. With declining sunspots, 80 will get better and better.

All experiments have shown that more radials make a real difference. It doesn’t have to be expensive wire. Old wire unwound from transformers, or the shield side of ancient coax will work just fine.

(Because of her place of employment, Lil Paddle must write anonymously. While this genteel lady welcomes correspondence, be warned that if you address her as “Ms,” she will tear your head off.)

12

Kurt N. Sterba

I’d like to start off this month’s column with a letter from an obviously astute person, which will then lead into a very helpful letter. First, from Bradley G. Mauger, KB5QZ of Greenbelt, Maryland.

Dear Kurt N.,

Hey! I like your column! So much that I got a lifetime subscription, so you better keep writing!

I am a young fellow (27) fresh out of college. I’ve got a few degrees in physics and Ph.D. level EE courses.

I’ve worked my way up to being an Extra Class. All this work for naught. You sum it up beautifully: Current in the air radiates. It’s

amazing how this simple fact can get obscured in other literature. The recipe I’ve used for antennas is:

1) Use a balanced antenna (grounding and groundplanes can be troublesome, lossy and, sometimes, impossible.)

2) Use balanced open-line feeders (coax is lossy and expensive — who needs it?)

3) Matching must be low loss (I use an old Johnson Match Box).

4) Resonate (tune) antenna and feedlines (makes it easier to match).

A 20-meter halfwave dipole fed by 16 feet (or so) of open feedline resonates on 10, 15, 20 and 40. It has gain on 10 and 15.

Now I find myself in a second-floor (of four) apartment. Nothing to tie a wire to. I’ve loaded up everything in sight without success. (My

wife's RF burns are healing up nicely — I guess she was just too reactive.) How about an article or two for us urban cliff dwellers?

By the way, about your 12/81 article, you say the SWR remains constant all along the line, except for a gradual decrease toward the input due to line attenuation. Some people have almost 100 feet of RG-8 between the rig and the top of the tower. No wonder they think their three-element tribander is flat across the whole 10-meter band! On 2 meters, forget it — 100 feet of RG-8, even unterminated, looks passable in the shack. Keep up the good work.

Right on cue, in comes Jerry Melson, KE1A, of Fairfield, Connecticut, who — as you will see — has labored quite a bit on behalf of the “cliff dwellers.”

Living in an apartment I quickly purchased the book *The Handbook of Apartment Operation* by Dan Fox, W2IQD when I saw the ad for it. It is really quite good, though written and directed toward the beginner amateur.

The text is paper-bound, 8 by 10 inches, and some 155 pages in length. Priced at under \$10, it certainly makes for interesting reading, even if you have had a great deal of experience in apartment and condo situations.

If I have to be critical, it would have to be on the fact that the author Fox was very conservative in some of his suggestions concerning apartment and condo operation. For example, he states that one should never, but never use an amplifier. Well, I have been using my Alpha 76A for years with no problems, at least none that have come to my attention. The author also states that an indoor antenna in a brick and steel building will simply not work. Well, that is NOT true. Never could figure out why a lot of books say that about indoor antennas and steel and brick. True, you will lose a lot of your signal... at least I think you will. However, I am now in such a building and have my dipoles around the apartment (I am on the top floor, eight stories up) and have worked well over 100 countries with very high signal reports, etc. Even work RTTY and SSTV, etc., with no problems and of course, use an amplifier.

If I had listened to the handbooks, various experts, etc. . . well, most of what I do is simply not supposed to work or work well. The building is less than 10 years old, has good wiring, but does not use cable TV.

So, in any event, the Fox book is excellent, but you still have to experiment. . . does have many

good suggestions for some very unusual types of antennas. He does state that no matter where you live, there is always an antenna situation you can use, and it will work. The author then goes on to show you how.

So, Kurt, would recommend the book. At least it will encourage the condo and apartment types that there is always a way. There really is.

Getting back to my station. I use counterpoise grounding which seems to work well. Of course, use a tuner and lowpass filters, etc. Use the latest in modern gear (maybe that helps, hihi), and have a heck of a time. My XYL is also a ham, so that explains the cooperation in my hanging up a slew of indoor antennas.

Thanks, Jerry, for a professional review.

A note to C.J.C. and others who may have been a bit baffled by my use of the term “barrel” in talking about the coax connector. I should have been more clear. The coax connector comes in two parts. One part plugs in and the other part tightens it on. The round, empty half is the “barrel.” And I meant that 19 inches is attached to the barrel, hanging down.

Onward. The laugh of the month. This IS a true story. An amateur called one the major amateur equipment dealers and said he wanted to order four, 2-meter antennas and the stacking harness. The clerk told the caller that he had never heard of such a thing and asked the caller if he was a CBer. The caller, who has been in radio for about 50 years, asked to talk with someone else. The clerk briskly told the caller, “I know more than anyone else here!” The caller, believing that could well be the case, took his business elsewhere.

The latest edition of the *ARRL Handbook* has come out. While in most parts it does indeed do a great job, there are some areas that need some work.

I guess the older I get the crankier I get, but I am really getting peeved at books (and the ARRL new beginner book does the same thing, too) that show the coax feedline just coming up to the dipole with the center to one side and the shield to the other side.

Possibly, that is why half the people who get licenses eventually become inactive. The rain ran into the opening and ruined everything. No one ever heard their signals from then on, causing them to lose interest.

The Handbook says, “The exposed end of the cable should be sealed against dirt and moisture,”

and leave how to go about it up to you. Friction tape?

Some articles show cornball connectors with broken Coke bottles, little plastic boxes, and all manners of things.

I recommend to anyone that they purchase a commercially made dipole connector such as those made by Palomar, Van Gorden, Budwig, etc. Do it right.

The Handbook talks about the sloping dipole and tells you that the higher the feedpoint, the lower the angle of radiation is. So far so good. But then they go on to say, "Excellent results can be had when the ground end of the antenna is only a few feet above the earth." "Excellent" compared to what? A garbage can lid? A sparkplug out the back of your tuner? "Excellent" seems a rather strong word to apply to a simple wire antenna. Fair or good would be more in line with what you can really expect.

Later in the chapter we're told this, regarding vertical antennas: "It is often possible to obtain

excellent DX results with practically no ground system at all." In some ways that is true. It has to be the day at the absolute peak of the sunspot cycle, on a Sunday morning when all the other hams are in church and you live in a county in Wyoming where you are the only ham and the DX stations are county hunters with about 3,000 to their credit. You may even get a QSL card without sending one first. However, "excellent" is leading one to expect too much.

What the noted antenna expert Ryan Johns says about verticals without good ground systems cannot be repeated in a family newspaper.

(Kurt N. Sterba, as has been mentioned before, is a "cover" for an amateur who requests anonymity. That way he can go on the air without getting into arguments. It is only his great knowledge that allows him, on 20 meters with a 2-meter "rubber duckie" and a Dentron wire tuner, to get "excellent" results in the contests.) □

13

Kurt N. Sterba

I looked. I pondered, I sat baffled. Could I be wrong? Or could the magazine I saw it in be wrong?

What I'm referring to is the antenna on page 48 of the January 1982 issue of *QST*, called a two-element wire beam. The puzzle is that both elements are the same length. Now I had been taught that for an element to act as a director or a reflector it must be either shorter or longer. Or, it must have a phasing line which makes a phase shift. Neither condition was met by the diagram or the text. Perplexing.

While I may be stubborn, I'm not pigheaded. So, trying to keep an open mind, I called the noted antenna authority, Ryan Johns. As I started to phrase my question, he mentioned he had already seen the article and started to laugh. I tried to get a coherent statement out of him about it but he just kept on laughing.

I guess Doug DeMaw was off QRPing in the Caribbean again when the staff was working on that page. It's also expecting a bit too much to call a two-element antenna a device that will give 6dB gain over a dipole.

Also, some of the articles lately have been saying that a Yagi gives a lower angle of radiation than a dipole. Sorry. *NO*.

The February issue of a magazine which claims to be very technical contained this statement, "a truly high-performance short antenna. . ."

Sorry, but that is indeed a contradiction in terms. They were describing a 12-foot antenna to be used on 10-15-20. First of all, even a full-size dipole is not a "high-performance" antenna. Such is merely a "unity" antenna and is the basis from which we judge upward.

Now, one might say, "good performance for its size," and that could be accurate. But there is no way that "truly high performance" can be applied to such a short antenna, no matter what you do,

unless you repeal the law of physics.

If anyone says, "But it loads up with a very low SWR!" let me refer you to the 50-ohm non-reactive resistor in your dummy load, about which you can make the same statement.

Recent editorials in *73 Magazine* have advocated abolishing the CW requirement for an amateur license. A lot of hogwash is raised like "many electronic technicians and engineers would like to become amateurs, but the code stops them." So what? A lot of aeronautical engineers don't have a pilot's license!

The editorials say the reason Japan has done so well in electronics is because the technicians and engineers sprang from the ranks of non-code hams. Bunk! Over 90 percent of Japanese hams hold only lower grade phone licenses, and "regular" hams refer to them as "Monkey Chatter." They are not the captains of industry.

The 73 editorials call CW obsolete and refer to devices that whiz 2,000 words a minute back and forth. What if they break?

Sure, practically everybody has a typewriter but handwriting is still taught.

CW is a form of communication. Definitely. Our astronauts still have CW equipment on the space vehicles. While your chances of being held captive by the North Koreans and spelling out t-o-r-t-u-r-e by blinking your eyelids while being part of a propaganda film, or being a downed flier and making a tap for a dit and a scratch for a dah while in the Hanoi Hilton, is remote, CW is still good to know.

Amateur Radio has received much space in the press by being on the scene when a ship called SOS. I'd hate to see a wire service story quoting a ham talking about some "little beeps" he kept hearing but didn't know what they were.

In a era in which some people complain about having to go to law school before they can practice law, let's at least have some standard in Amateur Radio. It is the one thing you can't buy or be tutored for. You have to work at it.

A fighter plane today carries more firepower than squadrons and squadrons of B-17s, but the pilot still has to take training on a rifle.

CW is fundamental and a valued resource. In any form of emergency a tiny CW rig drawing next to no power could still communicate. If all commercial power were gone, storage batteries run down, gasoline unavailable for generators, a signal could be produced on CW by a rig powered

with a little 9-volt transistor radio battery.

There is no "practical" reason for getting rid of the code and every reason for retaining it.

Back to antennas. Here is a real solution to a pressing problem. It may sound impossible, but as Loomis said, "Don't be afraid to experiment."

The Point Mugu Amateur Radio club, WD6BZS, had trouble getting an RF signal through all the steel and concrete of the Los Angeles Convention Center. They were there to demonstrate to the convention of handicapped that it was possible to become an amateur even if deaf, totally blind or with severe mobility disabilities.

Regulations prevented the Point Mugu Club from putting up an antenna anywhere inside. Plus, they could not run a wire on the walls or any structure. How would they get outside?

Jerry Kessler, WA6CAM, Laura Linder, WB7UZY and Bill Chandler, N6BED, solved the challenge by taping over 100 feet of #12 wire on the concrete floor across the aisles, through doorways, down ramps, finally outside and into a patio. The last 10 feet was run up to a small tree.

The results? Minnesota, Washington D.C., Nevada, Oregon, Washington and many California stations on SSB and CW.

For three days, Ed Sanders, WA6VJP, operated the 20-meter station and Bob Clark, K6BGU, was providing information, being the ambassador of good will to the handicapped for Amateur Radio.

The Point Mugu Radio Club spent their time opening horizons for those whose disabilities preclude many other activities.

Others demonstrated 2 meters, RTTY and computers. We must applaud those who give up their own leisure time to help others.

(The writer of this column goes under an alias so he may go to conventions and not have people he writes about stick out their tongues at him. He is a sensitive soul, as you can tell.) □

More on verticals

Dear Kurt,

The correspondence in the March 1982 edition of *Worldradio* with regard to verticals inspired me to write in order to throw in my 2 cents' worth on the subject.

Most designs used for verticals — both commercial and homemade varieties — are quarter-wave vertical elements, which means that every

ohm of resistance in a real ground system soaks up about 3 percent of your precious transmitter power. Since it is difficult to get a ground resistance as low as 10 ohms without a fairly extensive set of radials, you are doomed to waste at least one-third of your RF power heating your lawn under your vertical! I once demonstrated this beautifully on 40 meters when I fed a 32-foot pole against an 8-foot ground rod. It matched beautifully, but wouldn't get out worth a hoot. An ohmmeter check between my ground rod and a water pipe revealed a 20-ohm resistance for the rod. This added well to the 30 ohms of the antenna to give me an impedance of 50 ohms, but 40 percent of my power was going into the ground.

The important thing to remember is that the crux of the problem is the combination of low impedance and base feed. If you don't feed the antenna against the ground, you don't have to take this loss.

Some years later I built a successful (not "excellent," however) vertical* without radials. It was simply a *half-wave* vertical, center-fed, with one end standing on a ceramic insulator a few inches above ground. The only ground losses were the very slight losses from the electric fields

from the high-voltage lower end of the dipole getting into the ground. The antenna was a stack of various aluminum pipes that totaled 32 feet. It was center-fed with a gamma match on 20 meters, and gave me respectable reports from Ohio into Europe and Africa with 100 watts on CW. The bottom-fed sleeve dipole is another example of this; it is merely fed using the tubular section of the dipole as a balun for the coax; it is not fed against any ground. When this sleeve is expanded into a cone or series of sloped radials, you have the familiar "groundplane" antenna.

I just wanted to point these things out so your readers wouldn't avoid verticals altogether. They do give lower angles of radiation than low horizontal dipoles, and are very efficient if fed properly. You can feed a halfwave dipole from the end, too, with a proper impedance transformer — a parallel resonant circuit-fed with link coupling or one-turn tap works well. The popular 5/8-wave vertical popular on 2 meters is a variation on this.

73,

FRED J. DIETRICH, W6MOH
Palo Alto, California

**Dietrich, F.J., 73 Magazine, October 1966*

14

Kurt N. Sterba

I have returned. First, an apology. My employment demanded that I devote all days, nights and weekends to an important matter, denying me the opportunity to spend the necessary time to put my column together. However, please know that during my absence, I was looking out for your interests.

Second, the letters that so very many of you wrote to *Worldradio* about my absence, were forwarded to me, and snatching a moment here and there I read them all and was indeed touched.

Now to the matter at hand. To some questions sent in regarding tuners and open-wire line. Basics first. If an antenna is too short, it exhibits capacitive reactance. If an antenna is too long, it displays inductive reactance to the feedline.

The purpose of the tuner is to add the proper amount of capacity to balance out the inductive reactance or the needed amount of inductance to erase the effect of the capacitive reactance, and, of course, to match the resistance.

If you are looking for the most efficient antenna system of all, it is indeed with open-wire or, as some call it, ladder-line. There are some precautions that must be taken, however. Keep it at least twice as far away from metal objects as the feedline is wide. Do not make sharp bends, and do not close your window screen on it.

The virtues of it are worth the extra effort. You can forget all about SWR; for any length run you are likely to do, open-wire has very little loss. And with a nearly lossless feedline there is negligible loss due to SWR. Neat!

There are some purists who like to use RF

Ammeters (cheap at the surplus stores), one in each side, to see that everything is balanced.

To another subject. What if you had a dipole up in the air about 40 feet and your buddy suggested that you take it down, dig a big long hole, put half of your antenna in the hole, lay the feedpoint right on the ground, and stand the half remaining upright?

You'd think he had spent too much time with his head inside his amplifier, right? Well, so much for the so-called "image" antenna of the ground-mounted vertical.

Since the maximum current (and radiation) comes off the center of where the two halves of the dipole meet, it would be practically impossible to think of a worse thing to do than lay it right where a good portion of the radiation goes right into the ground. Crazy!

Howsomever, if you have deed restrictions, radicals for neighbors, lot-size problems or whatever dictates the use of a vertical, give yourself a fighting chance and get it up off the ground!

Feedpoints should be: for a 10-meter vertical, up 4 feet, 5 inches; a 15-meter vertical, up 5 feet, 10 inches; a 20-meter vertical, up 8 feet, 9 inches; a 40-meter vertical, up 17 feet, 7 inches; and a 80-meter vertical, up 35 feet, 2 inches.

Hold on a minute! I know you are already saying, "Hey what are you talking about? This 40-meter antenna is now a 50-foot structure?"

Yeah, I know. I was just talking about what you should do. Maybe you have a tree you could hang it from. Yes, the tree will absorb some, but it still beats warming up the worms.

Much has been made of the low-angle radiation of the vertical. Such is *only* true if a certain condition is met.

Radials! Now, radials are *NOT* some sort of reflective ground screen or some such nonsense you hear bandied about. What they do is catch some of the radiation that would be going into the ground and return it to the radiating system.

Obviously, the more "catchers," the more radiation you will have going where you want it to. There has been much research and several published charts showing field strength related to number of radials.

What a ground stake ground does for you is assure you will not be spending a lot of money on sending out QSL cards. One radial means the person handling your incoming cards at the bureau will have more time to get on the air. Two

is something better — it lets you honestly say "QRP" no matter how much power you are running. Use three and you will work JAs from the West Coast and KV4FZ from the East Coast.

Strive for 16. Now you will be competitive with a dipole, half-wave above ground.

Looking at the price of wire for all these radials may upset you a bit. Here's a solution. Your local TV repair shop throws away a lot of chassis. On the chassis are transformers. In the transformers there is l-o-t-s of wire.

After I came off my maddening schedule I caught up on the ham mags. There is some trash being written. I would hate to argue with those who are legends in their own minds, but. . .

The straight scoop is in the *ARRL Antenna Book*. It's the best 8 bucks you'll ever spend. I refer the buffoons who had the gall to write in and argue with me to the bottom of column three on 3-14 and the top of 5-5.

The *ARRL Antenna Book* is truly an outstanding book. So far, I have only one complaint about it. On 12-7 they talk about the Turnstile-Reflector antenna for OSCAR. The spacing for the reflector below the dipoles is never given. Instead, a reference is made to look at Chapter 2. (Where in Chapter 2?)

I guess in my advancing years I get more cranky, but I want what I am reading about where I am reading about it — not flipping — backwards.

What you must do is flip through 18 pages of Chapter 2 to find the chart of radiation patterns. Listening to some of the galoots that gather at the local ham store on Saturday (this is one reason I stay anonymous), I'm sure they would totally miss the connection between a "reflecting screen" on 12-8 and "perfectly conducting ground" on 2-18.

Then we see the newcomer to OSCAR who is putting up this primitive antenna being told, "Choose the spacing that best suits your needs. . ."

How does he know what best suits his needs? A good explanation of time in the pass and angle would have been helpful. Those writing the Handbook should assume everyone they are talking to is a total beginner. Maybe I'm just picky. I'd like to see more people on OSCAR — accountants, postal clerks, librarians, truck drivers, etc. — not just EEs.

If you have any questions just send them in. Any question. You'll get an answer. If you should stump me, (as unlikely as that may be, but this really isn't my field), I'll take the elevator up a couple of stories and get the answer for you. Let 'em rip.

(For a variety of reasons, Mr. Sterba's true identity must be protected. Tacky types who write in and say he sounds like someone whose 2-meter antenna is a king-size Coke bottle filled with salt water, are just jealous that he gets out so well with it.) □

15

Kurt N. Sterba

Many thanks to all who were so nice in writing to welcome me back. Hearing from you was touching.

I shall not respond to the impertinent remarks of the alternate columnist. You, however, should know, dear lady, that your true personality comes through. Because as the astute and perceptive Mickey McDaniel, W6FGE, said in a letter forwarded to me, "That broad sounds like a real crocodile to me — and anyone knows English crocodiles are the worst!"

Well take it from me (and who is in a better position to know?), truer words were never spoken.

However, on to transducers. Responding to a letter from Sharon Ross, KA9LYI, who asked about full-wave loops for 40 and 80 as well as a problem with a sloper which doesn't work very well but has good SWR.

An answer in three parts: First, low SWR has nothing to do with how well the antenna radiates or receives. Proof of that statement is your dummy load. Perfect match, lousy radiator. Next, the sloper. I don't know who it was that first sold that pot of cabbage to the hams. Crazy! Just think about it. One takes the coax up the tower, attaches the center conductor to a quarter-wave wire, and then fastens the shield side to the tower. Look carefully at what we have.

It is a dipole with the tower making up half of the dipole. In practically every case, the tower is *grounded*. Now, if someone came up to you and suggested that you attach the end of the dipole (which is the high-voltage part) to ground, you'd think you were being addressed by a real loon.

One would be far better off to run another quarter-wave *wire*, putting an insulator in the appropriate spot and tying the end off to a handy tree, garage, eaves of the house, fence or whatever. Also, try to build an extension of some sort that gets the feedpoint as far away from the tower as is practical.

Here's something that most people don't know — the inverted V doesn't have to be run in an exact 180-degree configuration. Or put in another way (for those who got their licenses memorizing 47 ohms, 18 inches, etc.), 180 degrees is one wire going north and the other south, or one wire east and the other west.

You can decrease the angle (looking at it from the top) to about 90 degrees before you start to get cancelling. Ninety degrees is a right angle, or the way the two sides of a table meet.

You may find that the lowest angle of radiation from such an antenna is in the direction the two wires point and away from the direction where they are tied down. (Yes, opposite of the way that a V-beam does best.)

What all this means is that if your tower is nearer one corner of your lot, you can still get up an inverted V. Actually, any size lot can accommodate an 80-meter inverted V. Get at least half the antenna (an 1/8-wave on each side) as high as you can, and then you can let what's left dangle, run along a fence, etc.

As for the full-wave loop — yes, super. Gain over a dipole, more capture area on receive. If one has the room, tall trees or whatever, something to consider is the full-wave loop in the triangle configuration. You can put the point at the top and feed it in the middle of the wire parallel to the ground. Feeding it at the corner, near the ground,

will give you the lowest angle of radiation if your bent is to be heard on Heard Island.

Next, a big long and loud “Bronx Cheer” to the recent article in a ham magazine that talked about using a noise bridge to give you a true

indication, the feedline *MUST* be a half-wave length (or multiple) at the frequency measured. The way to cut such a line (which is much shorter than the $468 \text{ divided by } F \text{ MHz}$ formula length) is with the noise bridge itself. □

16

Lil Paddle

The description of the half-wave vertical in this column brought some interesting questions from Dr. Donald Ramras, KD6GR, of San Diego, California.

Here are some answers. As is the case with practically any antenna, the higher the better. However, the bottom of this antenna, but a few feet off the ground, should vastly outperform the ground-mounted vertical. The size of the coax used in the antenna itself should make little difference. Tune it by trimming an equal amount off of each end. Now you may find, if the bottom is near the ground, that the shield side should be about 5 percent longer. That would really be playing the purist! In truth, there’s really a wide latitude before the difference can be heard at the other end.

One way to make the sleeve would be to use a smaller coax for the antenna itself and the braid from a larger coax for the sleeve.

Yes, it will work well for 20 meters. As for mounting the different antennas near each other, I’d recommend at least quarter-wave spacing to avoid interaction. Support it by any non-conductive lash-up that keeps it from falling down. True, no gamma match or any of that. And no, I cannot furnish a diagram of it. This is radio, not television. You have to use your own imagination.

Tell us how it works out for you. But check it out over a long period of time. Too often, antenna judgments are made too quickly — possibly on a day the sun either did or didn’t.

Next, Dave Witt, KA9GVI, of Berlin, Wisconsin was kind enough to share his experience which he puts this way:

Want an inexpensive all-band (80-10) antenna, that is easy to make and does not need to be mounted a hundred feet in the air? Read on.

This all-bander consists of a 40-meter Delta loop, TV twin-lead or open transmission line and an antenna tuner.

Step 1: Construct the 40-meter loop (141 feet). Attempt to keep all sides equal, but if not possible, continue anyway. One side of my loop is only 30 feet long, and the bottom leg is not straight, in order to avoid part of my roof.

Step 2: Connect one side of the loop to one side of the twin-lead and the other side of the loop to the second twin-lead wire. Feeding at the bottom will give the lowest angle of radiation.

Step 3: Run the twin-lead to the shack. Keep the line away from metal objects and don’t make right angle bends with it. Using TV line has a real plus, for a flat line is much easier to snake through wooden windows and costs less than coax.

Step 4: Connect the transmission line to your tuner as per the manufacturer’s instructions for a balanced line. Then ground the tuner.

Note: If your tuner has a dotted line on the metal between the single-wire post and one side of the pair for a balanced feedline, that means a strap of wire must be connected there for proper operation.

Step 5: Find with the tuner the ‘right’ settings for each band. Any point in a band can be tuned to 1.5 or less SWR. Sometimes these settings are difficult to find, but they are there. Tuners can be a little frustrating with three controls in what seems like an infinite possibility of adjustments. Read the instruction book that comes with your tuner.

Note: One method to get close to the ballpark is to first listen to the band you’re interested in, and

tune in a signal. Adjust the inductance for the loudest signal on receive, then adjust the two capacitors.

For my particular loop, one setting was found that covers most of 10, 15 and 20. A separate setting for 40 and another for 80 were found.

If you should find that several settings appear to be equal, choose the one that results in the plates of the capacitors being more meshed (closed) as the best one. Greater capacitance results in greater harmonic suppression.

Write down the settings in chart form, and then when you go to the particular band you can just reset the dials. You may find that over a period of time, the settings may change slightly.

On-the-air comparisons proved this all-band loop to be better or equal to all the assortments of single-band dipoles, long wires and other antennas that had filled the air above my house. Results on 80 meters even allowed removal of that dipole.

My tuner was purchased used for \$40 and I had most of the wire in the junk box. My inexpensive all-bander is good enough to get 5/9 from Guam.

Thanks, Dave, for giving someone else an idea to try out.

Now, something for the experimenters. Many amateurs have built the ZL special and/or the W8JK. The antennas use a phasing line in the middle. The beauty of the W8JK is that using a tuner, one can adjust the impedance exactly to match whatever results from being whatever height above ground. Also, the antenna can be used on any band above what it is cut for.

Now try this. Build the W8JK as before, but do *NOT* cut one of the elements in two. Leave it whole. Cut the other element in two and feed with open line at the break. Forget the usual phasing lines and crossed-over twisted lines or whatever. Instead do this. . . at both ends of the two elements, just prior to the insulator, connect the two elements. Yes, it now looks like a drawing for a giant folded dipole, but it isn't.

At a given height, up to about a half-wavelength above ground, this should outperform a two-element Yagi.

Another topic: While on Field Day we used Van Gordon baluns on our 40 and 80-metre antennas. We also have one on our 80-metre dipole at home. However, if you want something small — back-packing, etc. — I highly recommend the Budwig connector. Their ad is in *Worldradio*. They also

have very novel end insulators. This is not a “plug” because a long time ago we mentioned them also. Seeing their ad just brought them to mind again.

To me, seeing antenna articles in the magazines and handbooks showing use of a broken bottleneck or an old-fashioned glass insulator as the center support is like fingernails on the blackboard! Also, nix to little plastic boxes, etc. Do it right!

I bought my first Budwig connectors about 15 years ago. For connecting wire verticals (where you don't want a balun, as the system is unbalanced to unbalanced), they are terrific! And for those who obtained their licenses from CrackerJack boxes (Kurt is having a bad influence on me), Budwig even sends along the length figures to cut dipoles for several spots in each band.

Speaking of such, have you heard about the results from a recent one-day cram course in passing the ham test? Seems the FCC changed the tests slightly (really now, there are only so many ways one can ask questions about basic radio) and the crammers had great difficulties. Question that nearly 90 percent of them missed was the direction of radiation from a Yagi. They put down, in the direction of the elements. If it wasn't so tragic, it would be funny.

The regular students of radio did the usual percentage of passing and the “special class” went down in flames. There must be some object lesson in there to ponder.

If you should be attending a hamfest where VoCom is an exhibitor, ask Art Householder to show you their special demonstration on rubber duckies.

It almost seems disloyal to say this, but I haven't yet purchased the new RSGB book on HF antennas by Moxon, which is sold in this country by the ARRL. But I have heard it is excellent and does make one put on her thinking cap.

Now, a bit of waxing philosophical. There just has to be something new in antennas. Yagi and Uda did their thing back in the '20s. Moore made his shot in the '40s. What since, HFwise?

There just has to be some new concept, some progress. Everything else is undergoing sweeping changes. Where is the new form for antennas? Don't say there can't be one. Give it some serious thought. You might come up with it.

(Leftenant Lil goes by her alias in order to avoid confrontations with ninnies who make horses of themselves by making inane claims for

comparison antennas without realizing that the standard they were using had all the radiation effectiveness of a bowl of porridge.) □

17

Kurt N. Sterba

All Hail Doug De Maw! Praise be (appropriately call signed) W1 Fine Business! This stalwart QRP'er rose to great heights (in case you missed it) on page 47 of the November 1982 issue of *QST*.

Never no mind that the company involved advertises in the ARRL official journal; the Senior Technical Editor gallantly spoke his piece about the data sent out by Western Electronics.

I heartily recommend that you avail yourself of DeMaw's review. Truly he is a Commando. The statements made by the manufacturer are so bizarre that one can only imagine they are graduates of the Quickie Crash one-day course in advanced engineering. (We have heard that their new medical seminar takes two days — Friday on brain surgery and Saturday on heart transplants.)

Let's set the record straight on a few shocking statements made by the manufacturer. "Anything above 15 feet will work well." Friends, the only thing an antenna 16 feet up works well in comparison with is a garbage lid buried 15 feet underground.

"The height above ground has nothing to do with matching the SWR to the feedline, or feedline to transmitter, and it will not increase radiation efficiency of the antenna."

Well, let your buddy put up his dipole at 60 feet and you put yours up at 20 feet, and both of you go in some contest and see who ends up at the bottom of the heap.

If anyone has any interest in antennas at all, kindly purchase the *ARRL Antenna Handbook*. Next, of course, you have to read it. The book does no good tucked under your pillow, hoping osmosis will let the knowledge seep through. Such is not what they refer to when they speak of sleep learning. Notice the charts that show what

Frequency (MHz)	Feet	Inches
1.800	260	0
1.820	257	1
1.850	252	11
1.875	249	6
1.900	246	4
2.000	234	0
3.500	133	8
3.600	130	0
3.700	126	6
3.800	123	0
3.900	120	0
4.000	117	0
7.000	66	10
7.050	66	5
7.100	66	0
7.150	65	6
7.200	65	0
7.250	64	7
7.300	64	1
10.000	46	10
10.100	46	1
10.200	45	11
10.300	45	5
10.400	45	0
10.500	44	7
14.000	33	5
14.100	33	2
14.200	32	11
14.300	32	8
21.000	22	4
21.100	22	1
21.200	22	0
21.300	21	11
21.400	21	10
24.500	19	1
24.600	19	0
24.700	18	11
24.800	18	10
24.900	18	9
25.000	18	8
28.000	16	8
28.100	16	7
28.200	16	6½
28.300	16	6
28.400	16	5½
28.500	16	5
28.600	16	4
28.700	16	3½
28.800	16	3
28.900	16	2½
29.000	16	2

happens to antennas at various heights, please.

Then there was something on page 48 of the November *Ham Radio*. When I read that, my cigar almost fell into the bathtub water. While usually that particular magazine is right on, in this case I'd say, forget it.

If you have enough room to put that antenna up, you have enough room for a dipole. A vertical would be better than the antenna shown. The rule of thumb is that you can not scrunch things up and expect much from them.

Let's move on to something positive. A problem in many QTHs is having enough room to put up an 80-meter antenna.

There is one design that has worked quite well for those who have tried it. Dave Birkin, N6AWU, Technical Chairman of the Santa Clarita Amateur Radio Club, has come up with these dimensions. . .

First, cut two 10-inch lengths of thickwall PVC pipe (1-1/16 inch outside diameter). In a space of 8-3/4 inches, wind 197 turns of No. 18 enameled wire on each of the PVC tubes. However, be sure to use low-loss PVC. To determine the loss characteristic of the PVC place a small sample in a microwave oven. If the sample gets hot it is lossy. Find material that stays cool, or only slightly warm to the touch.

Going 33 feet out from the center insulator, put the loading coil (above). From the loading coil

run 46 inches of wire to the end insulator. Such is done on both sides of the center insulator.

Fine tuning would be accomplished by trimming the 46-inch wires. Yes, it works on 80 just fine in not much more room than a 40-meter dipole.

There are some old-timers who rant, "We had wooden ships and iron men, then we had iron ships and wooden men." I am not that way.

Far be it from me to put down hams who can't figure out the lengths of antennas because when that was presented at their crash course they had to go to the bathroom. I stoically accept the fact that we have hams who can't find the calculators in their shirt pockets using both hands.

(Why do the Russian Secret Police always send out teams of three? One to do the reading, one to do the writing, and the other to keep an eye on the intellectuals.)

However, to be of maximum assistance to all, we present here a chart of dipole lengths. Such is the computer work of Emmett Earley Jr., WA8USO. I spot-checked them on my abacus. You may cut your dipoles to these lengths with confidence

(Kantankerous Kurt goes by his disguise moniker so that during Sweepstakes he will not be slowed up by praise from the erudite or outbursts from the noodinks.) □

18

Dear Kurt and Lil fans:

Mr. and Mrs. Sterba dashed off to Europe on a delayed vacation and honeymoon. I'm Kurt's administrative assistant and you can call me Miss Beverage. Kurt phoned me from London right after coming out of Bush House, which reminded him that he hadn't sent in his column. (Their trip was unplanned up to the last minute.)

He felt very bad about it, and since it was locked up in his safe, there was nothing I could do about it. So he told me to answer the letters that would come in, which I shall do.

Kurt and Lil have rented a house in Hendon

near some of her family. A trip to the continent is planned where Kurt will talk to some of the leading antenna lights. Lil got on the phone and said I should warn readers about a recent ad appearing in the ham magazines claiming 12dB gain for a 5-element Yagi. Normally she is such a genteel lady, but this time she said that such a claim was bull bleep. Possibly the Bristol Cream Sherry got to her.

I shall do my best with the questions.

Hello Mr. & Mrs. Sterba!

Cheers for the marriage of two brains! I like it better when two give us such valuable antenna information.

Antenna Quiz

Do you really know antennas?

William Goswick, K5WG

- | | | | |
|--------|--|---------|--|
| 1. T F | For a given antenna length, the gain is practically independent of the number of directors. | 6. T F | Doubling the number of ground radials on a ground-mounted vertical will double the radiation efficiency. |
| 2. T F | Collinear arrays are always operated with the elements in phase. | 7. T F | When used for receiving, an antenna re-radiates half of the total power received back into space. |
| 3. | How high must a vertical antenna be placed above ground to function as a true ground-plane? | 8. T F | A 40-meter half-wave antenna packs more energy than a 2-meter half-wave antenna if the field strength is the same in both cases. |
| 4. T F | Radials for a ground-mounted vertical radiator must be at least one-quarter wavelength each to be effective. | 9. T F | The radiation resistance of an antenna is affected by the height above ground. |
| 5. T F | A good ground radial system under a horizontally polarized Yagi will improve the performance of the array. | 10. T F | The log periodic dipole array consists of a system of driven elements, all of which are active on a given frequency of operation |

I know you two to be old-timers for I just happen to agree with you and I'm not such of an OT. Only 57 and got my first ticket in 1940.

There are some things that have bothered me throughout the years for which I have not been able to come up with satisfactory answers. And there are varied opinions, even with some questionable theory to back some ideas or reasons.

First, I will start with the English-bred "Joy Stick" antenna. After reading the ads for years, years ago, I finally bit. What a disappointment!

That little plastic box of an antenna tuner got warm with just 100 watts into it, and its range was quite limited.

Now for the big question. The ad claimed that it was a non-resonant antenna! How can that be? Then, when I saw a coil in the middle of a few feet of metal tubing, I was flabbergasted. That thing has to be resonant at some fundamental frequency. All kinds of claims of DX with that antenna. I even wrote to an English acquaintance and he said that antenna at the same height as his 3-element 20-meter beam was as good, if not better, than the beam! Suffice it to say, the "Joy Stick" never did very well for me any place I put it.

But at that time, W6TYP, a neighbor of mine in San Francisco, was making record distances with milliwatts of power to a "Joy Stick." I wonder how he would have done with a good

antenna? We were stuck in apartment buildings downtown with little or no space for antennas.

Please explain that antenna to me pro and con.

Now for the quad loop. Most articles have the loop in the vertical configuration. I understand this loop will work superbly in the horizontal. I experimented with it at one time, indoors and on the perimeter of the eaves of the house for 40 meters. I worked Europe, Africa and the Far East with it indoors and about the same outside! How come this single quad loop in the horizontal is not written up? And what is your opinion on this loop in various configurations?

Now for the ZL Special. In almost every instance in which I have come across this antenna, they treat it as though it were a driven element and parasitic element. They make one element longer than the other. It just does not make sense, and I have had some big guns give all kinds of reasons and answers. As I understand driven arrays, the elements should be symmetrical and are! This should apply to the ZL Special, too, and that is the way one article has it, and the way I have always built it, and it is a great performer.

Now for the Mor-Gain antenna which I have used for years and which is a superb performer in small space. Please explain how it works on 80 and 40 meters. No one seems to have an answer, and the manufacturers keep it a secret.

And at last, now for the controversial quarter-wave vertical. This was the antenna I used for many years while trapped in apartment buildings in downtown San Francisco. I used old Army MS copper sections about 3 feet long that screwed into each other. I used around 21 to 24 feet, base-loaded with a 3-inch air-wound coil. I used it with one radial most of the time. It seemed to have a bit of directional push in the direction of the radial. The radial was pointed to the Pacific Ocean at ZL land. I had no trouble working the Far East, and EU and AF when conditions were good. SA was easy, too. I could see little difference when I added another radial or two.

In later years I used the Mor-Gain as a base-loaded vertical and also as a top-loaded vertical. I found that when I oriented it horizontally with a 95-degree angle bend, it worked the best and still gave me the omni-directional performance of the vertical.

One thing I forgot to say about my San Francisco vertical use was that I was usually about seven or eight stories above ground with the antenna, in the hills of that city. So it seems that if you can get a vertical way up in the sky you just do not need the extensive radial systems so many authorities say are so necessary. Maybe that was the reason the "Joy Stick" could do so well when compared to the man's Yagi beam at the same height. The "Joy Stick" could be nothing more than a long-wire vertical. Right?

A few years back I had a 2-element Yagi up about 20 feet which did yeoman duty on 20 and 15 meters. I experimented with a half-wave vertical (a coaxial dipole, center-fed with coax) against the beam. That antenna was great even at ground level, and at 20 feet (even with the beam), it was better than the beam at times. Even at ground level, it was better than the beam on some signals. Distance at the time had significance on this, of course. This was all on 15 meters.

So you can see, I am a firm believer in the vertical antenna. One radial for the quarter-wave. And a half-wave vertical is terrific with no radials.

The last few years, because of space limitations, I have been using a steel billboard shunt-fed as a 35-foot vertical, on 80, 40 and 20. Really need the tuner on 20, but get along without on 80 and 40 even though I have high SWR. I am not a purist. If it works I am happy!

Thank you reading, and I will appreciate your opinions and answers.

C.J. CASEBEER, K6CE
San Carlos, California

P.S. Here I go again. When I get wound up, I never know when to stop. Hi

I appreciate your educating the readers in *Worldradio* about the 5/8 — 3/4-wave verticals, especially on VHF where they are used so much. You do get an increase in gain just as you did with the old extended double Zepp! Half of the same principle. Ha! And as you say, there are more than one or two good ways to feed it. Some simpler than others and some more practical than others, but I have not seen them write up the extended double Zepp vertical! I have not done it yet, but intend to sometime when I have the time and space. It should somewhat outdo the vertical half-wave. Right? And it should be practical for the higher frequencies. Feeding it will take some thinking. I have ideas! Trying to use coax instead of open-wire feeders.

Regarding the conical or biconical vertical which is also the so-called "fat vertical," which gives broadbanding. What is the best way to feed this? The military used extensive radial systems for this and fed the radials (shield) and center conductor to the tower wires at the base. I have seen others say to connect the center conductor to the base of the tower which is insulated from ground. I doubt there would be any difference here. Why not both? Is there a better way, some way to feed at the top? Say, to connect the center conductor to the top wires and tower and the shield to the radials, but leave the shield floating at the top. Seems to me getting that RF (current) up there at the top is the thing to do. If the tower is grounded, then I suppose shunt feed of the wires or tower are in order. Any way to top-load this?

One thing I would like to emphasize is that any time a good ground is needed for an antenna, use a counterpoise in place of the ground and you will do away with ground resistance losses so common in trying to get a good ground. In other words, get the other half of the antenna as wire instead of ground!

Jack asks several interesting questions. First he asks about the Joy Stick antenna. This is a physically small antenna. It brings up one of my basic axioms. The radiation efficiency of an antenna is directly proportional to its electrical size. Electrical size, of course is expressed in wavelengths. And the reference is back to a half-wavelength.

An electrically small antenna, regardless of its configuration, has small efficiency compared to a half-wave dipole. So how come the Joy Stick radiates? Any electrical conductor will radiate

some energy depending on its electrical size in wavelengths and the amount of power put into it! So the Joy Stick is matched to your transmitter and some current is made to flow through it. Therefore, it radiates. How good is it? Compared to what? To a well-located dipole, it is quite inefficient, but it does radiate and we know QRP does work DX!

Another question asked by Jack concerns quad loops. He has tried a quad loop parallel to the ground and wonders why this has not been written up. A full-wave loop is a broadside radiator, just like a dipole. The quad loop may be placed horizontally and it will radiate most of its energy upward perpendicular to the ground much like a low dipole. Sure it will work, but not very well. The recommended position is to have the loop's center at least a quarter-wavelength above ground. At HF, this normally requires four supports if mounted parallel to the ground. Mounting it vertically is physically easier. This broadside radiation of the quad loop also tends to lower the angle of radiation from a conventionally mounted quad antenna, although the ground reflection factor is the stronger factor in the antenna's elevation pattern calculation.

Jack asks about the ZL special and other center-fed wire antennas. Yes, for the best feeder operation, the elements on each side of the feedpoint should be electrically identical. This causes the feedline (usually 300 to 600 ohms open wire) to have equal amplitude but opposite phase currents. This action results in cancellation of feedline radiation, which is highly desired. All open-wire line-fed antennas should be symmetrical around the feed location. A special exception is the end-fed Zepp. But that's another story.

Jack asks about the advisability of adding additional floating radials that are not in contact with the soil. A single radial may be used, insulated from ground about 18 inches, but if desired to walk under, then 6 or 7 feet. In the '30s and '40s, this single radial was called a counterpoise. A vertical quarter-wave with a single floating radial works very well. It has some directivity toward the radial end directions. The radial/counterpoise should be a quarter-wavelength long, but may be loaded if space dictates.

Increasing the number of radials makes the vertical more omni in the azimuth directions. It also increases the efficiency a bit, perhaps 2dB.

Remember, it takes a 6dB improvement to move the receiver's S meter one notch!

Dear Kurt:

I enjoy your antenna feature in *Worldradio*. I find it very helpful in many ways, and it is appreciated at this QTH.

This letter is for an antenna problem I am not familiar with, and I would appreciate your advice in reference to it, so here goes Kurt:

In *Worldradio* there was a nice write-up on page 42, September 1982 for a 4-element Delta-Quad, made entirely by stringing up some wires — a perfect idea for simple-effective DX-peditioner, or a Field-Day set-up; also good for any amateur interested in beaming to a fixed area.

What I would like to know is why did the author use 1/8-wave spacing for directors and reflectors? All the same spacing? Also, why 1/8-wave?

Now, this could be connected with wide-spaced beam theory; I know very little about it.

I noticed also that in *Worldradio* for March 1978, page 8, there was an article by Keith Machin, K6WG: "Optimum gain element spacing found for the Quad Antenna." It gave spacing theory. I don't know that one either; then again, that was five years ago and maybe theories have changed since then?

Would appreciate your opinion concerning the quad spacing problem or confusion here.

HARVEY COLUMBINE, W2MLO
Lynbrook, New York

Well, Harv, the spacing between parasitic elements varies for many reasons — some electrical and some physical. Electrically, the spacing determines the forward gain, which spacing is different for maximum rear rejection. The spacing also affects the impedance of the driven element, and thus the VSWR and feedline matching. The physical spacing is largely limited by the supporting structure, wind and icing considerations.

So, Harv, if you want the maximum forward gain for your design, in a 2-element quad, the spacing turns out to be 0.12-wavelengths — which is also expressed as 1/8-wavelength. Bill Orr, in his book *All About Cubical Quads*, shows this on a graph, as gain vs. spacing. Keith Machin, K6WG also confirmed this in his March 1978 *Worldradio* article. The feed impedance varies from 50 to 150 ohms when the element spacing is varied from 0.07 to 0.25-wavelengths

and is somewhat conditioned by the height above ground. The front-to-back ratio also varies with the change in spacing from about 3dB to over 20dB.

So you see, the spacing — while not critical — does in fact determine the electrical performance of a 2-element quad, whether a director or reflector is used.

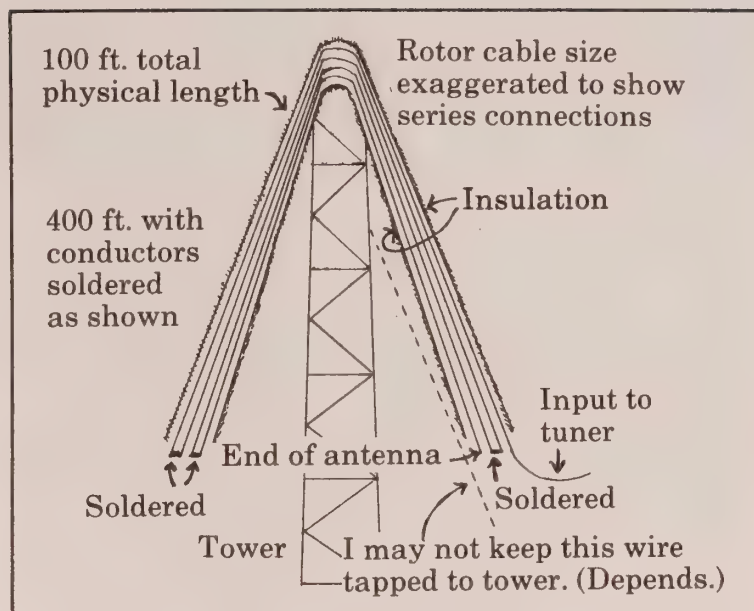
Dear Kurt,

I would like you to explain what kind of antenna I have here for the 40/80-meter bands.

I live on a 100-foot lot and have a 45-foot tower with my TH3JR on top of it, but I needed an antenna for the low bands. I noticed about 100 feet of 4-conductor rotor cable lying around collecting dust and realized that I would need a good 400 feet to use in conjunction with my tuner. I soldered all conductors in series and have, in effect, a 400-foot long wire with more capture area. It loads beautifully (with tuner) on all bands, and I've worked DX (Europe, Japan, South America) as well as checked into local nets on 75 meters with consistently good signals. I draped this 100-foot configuration over my 45-foot high tower. The input to the total length is on the same side as the end of the antenna.

Now that I finally got upgraded to Extra Class, I found that my so-called long wire is in competition with wire beams, phased verticals and KW s. So I decided to run a length of wire from the end of this antenna to my tower and tapped it down about six feet from the top. Now am waiting for sunset to work some DX. Please, if you can, explain what kind of lash-up I have here. I was told by rights it shouldn't work at all, according to antenna design.

RODGER RUNYAN, WB0GOB
Columbus, Nebraska



Well, I would suspect that this is a rare version of a sloper. The four conductors of this rotator cable have some inductance, which makes the 100-foot run electrically longer than its physical length. I also believe that he would get similar results if he put a loading coil in series with a single wire, running 100 feet, starting near his house up the tower and back down near the ground at the far end. Remember, a 100-foot long wire on the 40 and 80 meters presents a considerable portion of a wavelength and should be fairly efficient, compared to a half-wave dipole at the same height. (Ed. note: See page 92 for an update on Rodger's antenna.)

(Kurt, now in the land of Tanqueray and Schweppes, missed Sweepstakes for the first time in many a year, possibly the better, as the fight over who would operate the rig may have split asunder a happy home. Lady Di-Pole, once a "G", once again gets to drive on the wrong side of the street.) □

Antenna Quiz answers

- | | | |
|--|-----------|---|
| 1. True | 6. False | |
| 2. True | 7. True | |
| 3. One-quarter wavelength | 8. True | Since the energy is evenly distributed throughout the wave front regardless of the wavelength, the effective area that the receiving antenna can utilize varies directly at the square of the wavelength. |
| 4. False | | |
| | | |
| 5. False | 9. True | Only part of the elements are active on a given frequency. |
| A ground radial system under a horizontal beam is a waste of wire. | 10. False | |

19

Kurt N. Sterba

Incredible! Unbelievable! The following was in a national publication:

"I have always thought that antenna height didn't make much difference after a quarter-wave off the ground, but the other day I was watching VE7BTO and ZS6DT ragchew (RTTY) while the South African station cranked up his tower to 100 feet. Yup, it does make a difference.

Baffling! How can someone spend many years in this fascinating avocation and not have learned the very basics?

The truth is, a quarter-wave off the ground isn't even a starting point! Good grief, what do people have against cracking a book or two? At a quarter-wave above ground the angle of radiation is practically straight up, and what goes straight up, comes down straight down. This is called going nowhere.

You've got to get up a half-wavelength to get a take-off angle of 30 degrees; one wavelength up and the angle gets down to 15 degrees.

The higher angle radiation makes more hops up and down between the earth and the ionosphere. Each time it hits the ground or the layer, there is absorption.

There is another factor. The high-angle signal will pierce the ionosphere and the low-angle signal will skitter along the roof of the layer.

Converting all this to practicality — on 20 meters the guy with an antenna 35 feet up (a half-wave) will run circles around the guy 17 feet up (a quarter-wave), and the ham up 70 feet (1WL) will work DX the 35-footer won't even hear.

Don't ever let anybody kid you that height isn't important. Going from 35 up to 50 will make a great deal of difference. You'll say, "How come all those people haven't been on the band before?"

The word amateur comes from "amator," for the love of it, which would make one think that people would learn as much about it as possible. Unfortunately, we do have our share of real bozos.

Recently, there was a major emergency. While most amateurs conducted themselves admirably,

a few were buffoons. HF communications were necessary, and as high winds had knocked down the store-bought Yagis, there was a need to put up dipoles. Overheard on the repeater were the following remarks:

"I don't remember the formula for a dipole." "I can't put up a dipole: I don't have a balun." "Since the electricity is off, I can't solder the connection." "I don't have enough wire to make a 10-meter dipole."

Maybe those guys could go on television as *The Four Stooges*.

None of those guys will ever read my remarks because it's obvious they don't read anything anywhere. What they should do is voluntarily mail back their licenses to the FCC, or to the CrackerJack Company.

For the benefit of any 9-year-old reading this at the barber shop, or someone who has never heard of radio reading it at the dentist's office, here is the formula: Just remember 4-6-8-, as in 2-4-6-8. Take the 468 and divide it by the frequency in megahertz or megacycles (the numbers around the bandswitch). Example: 468 divided by 14 equals 33.4 feet, or 468 divided by 7 means 66.8 feet.

Real hams will gain nothing from this column, but for any illiterates who might find themselves in an emergency situation, there is another system also. If you can't remember 468, try to burn "300" into your brain.

When you divide 300 by the frequency in MHz, you get meters. Multiply that answer by 39.37 (inches in a meter). Take that answer and you have the full-wavelength. Chop that in half, take off five percent, and you have the dipole length.

Remember, normally you cut the dipole in half and feed it in the middle.

As an aid, note that a meter is about 9 percent longer than a yard. Also, you can divide 300 by the wavelength and come up with the frequency (in MHz).

While we call the bands 80-40-15-10, that is really sort of a shorthand for what they really are. To be more precise, 3.5 MHz is 85.71 meters, 7.0 is 42.85 meters, 14 is 21.42 meters, 21 is 14.28

meters and 28 is 10.71 meters.

Now the actual truth of the matter is that if you put up something that is somewhat close to the right lengths and fed it with coax in the center and used a tuner, everything would be perfectly fine. In fact, you could be way off and the tuner would make it all right. (Of course, that has to be a tuner capable of handling coax-to-coax.)

Possibly a handy addition to the shack of those interested in emergency communications would be those little tuners for end-fed operation. You could build one from the parts of an old Command set.

An end-fed wire will work just great. Any kind of wire will be OK. Keep a couple of hundred feet of plain old electrical wire around — the kind that goes to lamps. It's easier to untangle and no one touching it is going to get zorched.

For those whose motto is "Be Prepared," mobile HF antennas can be stored. The price of an old Webster Bandspanner is low. Those who want to show some class could get a "Spider" from Multi-Band Antennas.

Possibly I should be less critical of the "I forgot the formula for the dipole" clod. For many years, the *Handbook* had a little table that showed the

lengths for many spots in each band. It isn't there any more, but now that I think about it, anyone who can't remember the formula for a dipole probably doesn't have a *Handbook*, either.

Not to sound sexist or take a cheap shot by saying, "Ahhh, my wife knows more about antennas than those four dodos," but it's true! And she will be writing this column next month.

The Grrrr Dept. Someone wrote to me and asked, on behalf of a friend of his, for a special design antenna to suit a particular purpose. I spent a lot of time on it only to hear that the friend had disagreed with my dimensions. Gadzooks! Remember, the length for a full-wave loop is different than four times one-quarter wave or twice that of two times half-wave. There is about a seven percent difference.

Forsooth, do not disagree with me until thou has put it up and checked it out with a transistORIZED grid dipper or noise bridge

("Kurt" who brings you good karma asks to be disguised in order to speak the truth and not have to argue with yahoos who think the parasitic array was invented by Dr. Sushi) □

20

Lil Paddle

Kurt, you are NASTY! Your comments in last month's issue were terrible. So you got to put down some with lesser knowlege. Shameful! So they don't have the same background you do. What would you know if your Uncle Sammy hadn't sent you to radio school and then given you the GI Bill?

You Ft. Monmouth wonder. I've grown so tired of your buddies coming over to drink beer (How you can call this lolly water of yours beer is beyond me!), hearing you say, "Haw, incentive licensing is nothing new. We knew if we flunked out of radio school, we'd be trading in our soldering iron for eight and half pounds of clip-fed, gas-operated, semiautomatic. . . That was real 'incentive!'"

Who else on this earth sleeps with a 1945 *ARRL Handbook* under his pillow? Who else walks around with such an old book clutched to his chest and proclaims, "Best dollar I ever spent." Sometimes you are insufferable. And you must be the only person east of the Mississippi who keeps insisting on calling dipoles "doublets." Yecch!

Hams aren't the only ones with stoops in their lot. Several years ago when I lived in a community in the California desert. I'd help with the searches for downed pilots.

One time when I showed up at the airport to assist in a search, the constable told me we'd be looking for someone who had NOT filed a flight plan and was in a light tan airplane. Figuring that such a jackass deserved his fate, I turned around and went home.

Let's look at antennas. There was an excellent

article in the last issue of *Ham Radio* about the Bobtail Curtain. It touched on something that we mentioned here some months back which deserved a more thorough investigation.

The question is: Have we been feeding the quarter-wave vertical in the wrong place all these years? Take a close look at what we do now. The maximum current point and main lobe is right at the ground. And right into the ground it goes. Strange, we couldn't think of a worse thing to do if we really tried!

Why not feed it at the top? Testing this out would be an interesting project. It does amuse me to hear people say, "I like to experiment with antennas." And they go out and hang up another plain old garden variety inverted-V.

Here's something to experiment with: a vertical dipole, center-fed, the bottom a quarter-wavelength above ground. The feedline should be perpendicular to the antenna for at least a quarter-wavelength. Such an antenna will give you a lower angle of radiation than a dipole one wavelength above ground. On 10 metres the structure would be about 24-1/2 feet long; on 15 metres, 33 feet long; and on 20 metres, 49 feet long. Those in the know, know that angle of radiation is more important than gain.

Another antenna not receiving its fair share of work is the horizontal loop. It looks like a one-element quad tipped over flat. It is very good on 40 and 80 for regional contacts. Such an antenna can be strung around the yard in practically any manner. The effect is that the radiation goes up and down — good for a many-state area but poor for DX. The dimensions to use are for a full-wavelength, and then tweak.

Contrary to popular opinion, a full-wavelength loop does not have to be a perfect square or triangle; just do the best you can.

Some people are finding that the Delta Loop can be height-sensitive with the higher altitude not always the best.

Now a special present for those who did read my column down to here. Some antenna work in Europe is indicating that there are better shapes for the loop elements of the cubical quad. One modification is to turn the square into a long

rectangle with the dimensions being 3 on the vertical to 1 on the horizontal. Or, put another way, the top and bottom horizontal wires are 1/8-wavelength each, and the two vertical wires are 3/8-wavelength each. Remember that a one-wavelength loop is actually longer than the free space figure for one wavelength at a particular frequency.

When comparing the rectangle loop to the square loop, you should see a bit over 2dB gain. Matching may be a bit trickier, though. What you might try is a 2-metre quad using the rectangle loop. For 147 MHz, a loop of 80 inches is a good starting point. The reflector should be about 85 inches and the director about 75 inches. You can pump some energy from your hand-held into this array and observe the results on a field-strength meter. Testing a new idea at 2 metres and then enlarging the dimensions on a ratio for another band such as 10 or 15 is called "modeling." Be aware that at 2 metres different sizes of wire can mean a different resonant frequency — start with #12 or #10 wire.

The spacing between the driven element and the director starting point is 15-3/8 inches. Between the driven element and the reflector, start at 20-1/2 inches. Juggling lengths of elements and the spacing will affect gain, bandwidth and front-to-back ratio.

Feeding an antenna with open wire and a tuner makes life a lot easier.

If you should do any actual "experimenting" along the above lines, (or on anything else), write in and tell us what you found.

Also, if you have any antenna questions, send them in and I'll answer them here. And when you read in the ham magazines about someone loading up something that looks like an aluminium Christmas tree and they say it works almost as well as a full-size antenna, please know that's a bunch of rot.

(Lady Lil goes by her covert moniker so as to not have her sage wisdom challenged at gatherings by the less-than-bright who think that the volt was named after Voltaire.) □

To keep you, the reader, alert, nine inconsistencies have been purposely included in this book. When you find one, you, too, can say, "Aha!"

21

Kurt N. Sterba

Well, Lil, you've cut me to the quick. The things you said about me! A few, I must admit, are with some justification. I shall turn over a new leaf. . . at least part way.

Here is something for the newcomers — a chart to plot SWR across the band. Take your SWR readings at each of the frequencies on the chart and make a dot with pencil. After you have plotted each frequency, draw a line connecting the dots.

This will give you a visual representation of your antenna. Then you can shift the point of lowest SWR to your favorite operating portion of the band.

If at present, your antenna's lowest SWR is at a frequency point lower than you want it, shorten the antenna. If your antenna's SWR minimum is at a frequency point higher than where you want it, lengthen the antenna.

Of course, you take off or add on equal amounts on both ends of the dipole. And don't forget, if you have the SWR bridge in which you zero-in the reading in the forward position, do so at each and every frequency point.

The lowest SWR point indicates the resonant point of the antenna. Why, you may ask, does it not always go down all the way to zero SWR or, as the bridge would indicate, 1.1?

There are two forces at work here. First is the reactance. If the antenna should be too short for the preferred frequency, the antenna would show capacitive reactance. If the antenna should be too long for the chosen frequency, the antenna would exhibit inductive reactance. (What antenna tuners do is add one or the other to compensate.)

When you have neither C reactance or L reactance, you are at the right length. That's the easy part. Now comes the hard part!

Let's assume you show an SWR of 2:1. If your transmitter has a 50-ohm output and you are using 50-ohm cable, you will find either your antenna is 25 ohms or it is 100 ohms.

See the relationship between the SWR and the

antenna resistances? If you show a 3:1, it tells you the antenna is either 16.6 ohms or 150 ohms. Obviously, you must do something to the antenna — raise it, lower it, get it away from objects affecting it, etc., or you must "match it" to the line in one manner or another. There are baluns that can do the job, spreading the wires that connect to it, or use a tuner.

It is the combination of antenna reactances and resistance that determines the antenna's impedance.

Ham Radio magazine, in their March issue, contained the article on the "Bobtail Curtain." Certainly recommended reading for those seriously interested in antennas.

QST, in their March issue, had an article on the outstanding "X" Beam. I'm sorry they did. While I'm quite dedicated to my readers, and answer every question to the best of my ability, that was one I was keeping for myself. Now that the cat is out of the bag, (and I have turned over a new leaf), I will tell you that the claims made by the *QST* author were completely true, if not a bit on the modest side (for a change). The "X" beam is outstanding! Space for space and dollar for dollar, it is the best.

Now that we've talked about antennas useful from 10 down to 80 meters, let's look at 160.

With the sunspot cycle wobbling downward, 160 gets better. DXing on 80 and 160 is best when the higher bands are at their worst.

Yes, I can already hear you saying, "Who's got room for a 160 dipole?" Few, it is true. However, if you have the room for an 80-meter dipole (or even less) you can go on 160. Here's how: Get about 130 feet of 300-ohm twin-lead (TV wire). Short one end. That is now the far end. With the other end, put one wire to the center of a piece of coax. Put the other wire to the shield of the same piece of coax. That is also the ground end, and as much ground system, radials, counterpoise as you can put together should be used. The lack of an extensive ground system should not stop you. Even the old water faucet will help some.

The other end of the coax goes from a tuner to an SWR bridge, and then to your rig.

Now, with the twin-lead you go UP as far as possible, then extend the remainder horizontally. You may remember that we've discussed this concept in recent columns.

You can run a lanyard from your tower or a tree to hold up the vertical part. If need be, you can even bend down the horizontal part at the other end.

True, this is not an antenna that will get you 160-meter WAZ over a contest weekend. It is, however, an inexpensive and quick way to let you sample the "Gentleman's Band."

A caution. Any time you see an article recommending any sort of Mickey Mouse center insulator for a dipole, such as the one I just saw — plastic cut from the lid of a plastic pail, *FORGET IT!* Spend a couple of bucks and get a Budwig or Van Gordon. Do it clean, neat and right.

In the April issue of one of the ham mags was

probably the most stupid thing I have ever read about antennas anywhere. First, for someone to write it, and then for the editors not to catch it, would be laughable if it weren't so *DUMB*.

Since I am trying to be a nice person, (just to show Lil that I can be), I shall not name names. (If you spotted it, too, drop me a QSL card in care of *Worldradio*.) What I will do, a few months down the pike is back into the subject, so as to let you have the correct poop. I wonder how many hundreds of cards from the knowledgeable I'll get.

As always, your questions are welcomed.

(Contrite Kurt goes by this moniker so he can go to Dayton, speak to the people at a ham mag that prints unintentional jokes, and everybody keeps their cool.) □

22

Lil Paddle

Kurt, you're a relic of bygone era! You call 160 metres "the gentleman's band" — what about all the ladies who are on 160?

Speaking of 160, Howard Hawkins, WB8IGU, has worked out a 160 antenna in only 30 feet overall. Starting at the top, a 6-foot rod. Then, #18 enamel wire, close-wound for 600 turns on a 4-foot long piece of PVC pipe. (I shan't give you the diameter; work out something for yourself.)

That coil then feeds to a 20-foot TV mast (or two 10-foot ones coupled together). You can use a Coca Cola bottle as the base insulator. From the bottom of the mast go to a 350pF variable capacitor and then to the center conductor of 50-ohm coax. Ground to the shield side.

The usual addendum to anything written about verticals, performance is relative to grounding system, is applicable here.

Thus, you have seen it is not necessary to have a large garden in order to be on 160. There is, however, a problem with vertical reception on that band. To be quite frank about it, there's a

somewhat deplorable noise level. A common solution is a horizontal receiving wire of some nature. Shielded loops in the radio room itself have been used to fight the problem.

Another problem resulted in a rather novel solution by John Reed Sr., WD0CCW. Mobile in a van, he has been working VK and ZS, etc., with a Hustler brand vertical. Here's the twist: He took five-conductor rotor cable and cut the wires to a quarter-wavelength for each band. The wire is taped and tie-wrapped to the frame.

John says on-air tests with other stations show a definite difference in signal strength when the counterpoise is used. He makes the point that the wire should run in a counter-clockwise direction.

Some experimenters, in quickly throwing together a Yagi antenna, find a problem in getting a proper match. An English amateur, one C. Loftus, G6AFJ, writing in *Practical Wireless*, found this solution. Using aluminium tube of 12.5mm diameter, the reflector for a 2-meter Yagi is 1041mm long, the director is 927mm long; reflector to driven element is 495mm; driven element to director is 432mm.

Now comes the clever part. Loftus took some motorcar brake pipe (two lengths, each 584mm), and did this with it: One half of the driven element extends for 381mm, then a right-angle bend for 12.5mm and then another right-angle bend for 190mm. It looks like a partially completed folded dipole. There is a 1-inch spacing between elements, and is fed directly with 50-ohm coax.

Varying the gap between the 381 portion and the 190 length should drop you right in on the spot. No tricky gammas, Ts or whatever. Such could be scaled up or down.

Now, something for those in very restricted space circumstance, so restricted that you can't even get out four radials for a ground-mounted vertical. Starting with the 10-metre band, get two poles about 9 feet long and strap them 8'8" apart to, let's say, your back garden fence. Coming from the center conductor of the coax is a wire going up one pole, across in the air to the other pole, down that pole, and then back to the original pole and connecting to the shield side.

This should be rather better than the usual performance of a vertical with one or two radials.

If conditions should permit, you could really gild the lily by building another loop 4 ft. 2 in. behind that one, making the dimensions 8 ft. 11 in. on a side, which would act as a reflector. Yes, it is truly a quad on the ground, keeping a low profile, but with a vastly different outcome from other semi-hidden antennas.

It should be noted that dimensions given are but starting points in this situation. Some of the less astute among us will begin to desert 28 MHz in times to come. However, others will continue to be ever alert for the unexpected openings.

In conditions extremis, loops may be hung from eaves (two-storey house, 20 metres), squirreled away in attics, and so forth, limited only by your own imagination. Such would be rather more efficient than verticals sans proper radials systems.

One resourceful amateur with a two-car garage put the apex of the dipole under the peak of the

roof, snaked the wires every which way and ended up with fairly good signal on 40 metres.

An apology is in order. A letter was sent to my "worser" half. He has totally misplaced it, for which he is dreadfully sorry. The letter writer was even kind enough to enclose an SASE for an answer.

Please accept a late answer. It had to do with the noise bridge, a half-wave line, balun and tuner. The answer is, yes, a coax balun — as mentioned — would have to be taken into consideration if it was a 1:1 balun. Should it have been a transformation balun — 4:1, for example — then the half-wave line would repeat the impedance seen at the end of the balun.

However, if you always use — as mentioned — a tuner, utter finesse is not necessary as the tuner will actually and truly correct for whatever condition exists. Of course, that is if the range is within that of the tuner.

Speaking of tuners, if you should see at your local flea market the old Johnson Viking Kilowatt Matchbox, give up eating lunch for awhile if necessary, but *GET IT*. Note: the smaller 250 watt version looks similar, so don't be fooled.

The difference is far, far greater than the power handling capability. It is in the actual construction and distance from the coils to the case. Yes, the difference is so great that you will hear signals on the big one that will not be heard on the smaller one.

Kurt says next month he will present a very interesting letter from KA0JWO. Let us hope he doesn't lose it in the meantime. I'd suggest that if you are keen on getting an answer, you despatch your queries to me.

(Lil goes by her disguise name in order to avoid confrontations with the lost-in-space hamateurs amongst us who, when hearing someone mention entering "Sweepstakes" says, "I'll bet if you don't subscribe to any of the magazines they throw your envelope away and you have no chance at all to win the \$250,000 house.") □

To keep you, the reader, alert, three inconsistencies have been purposely included in this book. When you find one, you, too, can say, "Aha!"

Kurt N. Sterba

Here is a rather interesting letter on what can be done with a minimum of.

Dear "Kurt N. Sterba",

I look for your articles every month in *World-radio*, along with the QRP column! In spite of all the pithy comments, there is always something new for me to absorb, and it helps my limited knowledge of radio theory.

I am a self-styled "drugstore" ham! I buy it off the shelf and when it breaks I take it back to the same store to be repaired. No apologies! I got my Novice ticket with ARRL material and my General with a Bash book, and I'll probably get my Advanced and Extra with the help of the latter.

I thought you might be interested in one of my antenna experiments that was a success! I live in a condo and with the exception of my downspout/gutter and a long wire laying on the shingles, all of my antennas are in the attic, which has a peak at 30 feet. I run a Ten-Tec Argosy and feed everything with twin-lead and use counterpoises for grounds.

Anyway, I built a 15-meter dipole from 18 in. sheet aluminum kitchen foil. The "wire" is clipped over a run of twine and the antenna lead is fastened with alligator clips. The improvement in reception is absolutely amazing over a regular dipole, and I am convinced of this fact. I am also convinced that there is no gain but you have to hear them before you can work them, right? That particular antenna was expanded to a 20-meter dipole with clip-on wires at right angles and as a bonus, it also loads nicely on the 40-meter band and does even better than my long wire on that one, TX and RX!

On 20 meters the bandwidth is exceptional, and I can work the entire CW and phone portions without re-tuning if necessary, and the SWR is never over 1.3 to 1! 10 and 15 meters are fair but 40 meters is a bit narrow, as would be expected. But four bands on a 33 ft. antenna is pretty good to my way of thinking, especially when you consider the whole deal cost me about \$5!

I have also tried other configurations, including around the walls of a room, inverted Vee and random wire. A shortened version with 8 feet

in a dipole configuration will also work with low power and some patience. For an apartment ham or a ham in a motel room this design is quite a boon! This summer, I plan to make a wire beam in my attic, and I have a hunch this is going to be some performer.

Can an apartment ham work DX? You bet, and I have about 68 countries after two years of operating and some of these on QRP. I do not work contests or pileups and prefer a simple ragchew to anything else. I work about 98 percent on CW.

Your coverage some months back on delta loops was appreciated, and I have operated some QRP portable with them on 15 and 20 meters. Very nice! I would like to see you touch on coaxial dipoles and wire beams which would have a good appeal for a cliff dweller like myself.

Thanks for an interesting if not a provocative column! Hope to hear you on the bands one of these days. If you hear a ham tell you he is working a "Reynolds Wrap dipole," I'll expect you to identify yourself. Hi!

DAVID GAUDING, KA0JWO
St. Louis, Missouri

OK, Dave, if I do hear you on I'll give you a quick KNS on CW, but that's all.

To a subject that is strange. I've heard hams say, "I'd get on 80 but I don't have the room for an antenna." And that's from people who are already on 40!?

First of all, great height is not required and in fact, may defeat the program. A low antenna has a high angle of radiation, which puts most of the signal right back where you want it, around your area.

Next, a quarter-wave wire fed with a tuner will work just fine. In fact, some people are on 80 using the outer shield and half of their 40-meter dipole! Or, try tying center and shield together and go into the tuner with that. If your house were but 35 feet on a side, you could put an 80-meter dipole under the eaves, or you could snake the wire here and there along the fence.

If all else is impossible, there is the vertical. But, you may scream, "If I don't have the room for a dipole, where will I put all those long radials?"

Forget them! What most don't realize is that unless you can run out *LOTS* of radials, running them out long is just an exercise in enriching the pockets of the copper manufacturers. What you should do, with limited space in the length direction, is run as many *SHORT* ones as you can.

Oh yes, some OFs will write in and argue with me, but the fact remains that you are wrong and I am right.

An addition to earlier statements: When using any end-fed wires, single-fed wires, make sure you ground to the water pipes, sprinkler system, chain link fence, whatever. Also, a wire cut to quarter-wave, connected to the ground post on the tuner, and run around the baseboard will help.

You might try bonding your window screens together and loading them up on 80. If you have lots of windows, you might really have something.

If you should think you can't get out with strange antennas, just remember that for the last 50 years, operators in the clandestine services have been sending messages with antennas that are not full size and a wavelength high. Such would certainly be: "Here I am, come and get me!"

Now an apology is in order. For some years I have snorted and wheezed when hearing something stupid said, such as in a recent issue of a magazine in which the writer said he put up a wire antenna and cut it at 492 instead of 468, because since he wasn't using insulators there wouldn't be any "end effect." Obviously he never heard that *AIR* was an insulator. Besides which, it is the velocity factor of wire that makes a wire antenna shorter than the free space figure.

I have thrown in comments about such people that they must have gotten their licenses out of a CrackerJack box.

I'm sorry. My conversion came about this way. I've been cleaning my basement. Basements are boxes full of things put away, that you don't need and possibly never will, but you can't bear to part with.

I found something I paid 25 cents for. Yes, a quarter. It was the First Postwar Edition of the ARRL License Manual. In 30 small pages, all the rules and regs and all the theory (68 questions for Class B, 52 questions for Class A) that you would need.

The ARRL said the book "contains questions and answers such as are asked in the government examinations. If you know the answers to the questions in this book, you can pass the examination without trouble."

Yes, I can see why they said, "If you know the answers to the questions in this book you can pass the examination without trouble." Because they were, (as I remember), the questions and answers that were on the test!

Note: I am certainly *NOT* defending today's quickie road to a license, *BUT*, I am curious about the ARRL "holier-than-thou" attitude and not allowing Bash to advertise in their hallowed journal. Same for the genius of the New Hampshire hills.

Yes, no wonder the ARRL said about their License Manual, "It makes a simple and comparatively easy task of what otherwise might seem difficult." Absolutely right! That's one thing about the League — you can always believe what they say.

My question is, how did anyone ever flunk the test when they had a book like that around?

I guess before we all go running off the mouth about today's literature, we should go back and review what we used to study with. Because, as smart-mouth Lil says to me: "I think the reason you liked the Signal Corps so much is that they gave you your first pair of shoes."

Now that I have gone back into yesteryear and taken a good look, I think advice to some quarters in hamdom would be the bit about "casting the first stone."

While I still think no one should be a ham who isn't at least half as smart as I, no longer will I lash out at the oafs. For I have found that the test doesn't really ask very much of people. They did what was asked of them, period.

The ARRL said, "The questions and answers in this booklet are designed to give you all the knowledge you need to answer the actual examination question." (Then they said they aren't really the same questions, etc.) "What they are, however, are carefully prepared items designed to insure that you have the necessary knowledge to cope with the actual test queries."

Gadfrey! Why didn't they offer a money-back guarantee that you'd pass the test?

There was not a single antenna question on the Class B exam nor on the Class A.

(KNS goes by his DBA for the same reason some great jazz records were made by Roger

Short and Art Salt. That's pretty arcane. Will we get a letter from an ultra jazz buff?) □

24

Kurt N. Sterba

Unbelievable!!! A hammag which has as part of its title *Amateur Radio's Technical Journal* ran a review of HyGain's TH7DX tribander and said:

"The maximum forward gain claimed on 20 meters is 8.0dBi; on 15 meters, 8.7dBi; and on 10 meters, 9.6dBi. These gain claims appear to be fairly accurate according to just-calibrated S-meter readings and numerous on-the-air reports."

Fascinating! One can only assume they were running "A-B" test with the TH7DX on top of one 100 ft. tower and an isotropic radiator on top of another 100 ft. tower.

I sure wish they had taken a picture of that isotropic antenna! The TH7DX sells for \$375, and according to their review is but (on 20) only 1-1/2 S-units stronger than the isotropic. Or, put another way, 6dB better than a dipole. So instead of being 20dB over 9 with the TH7DX, you would be 11.15dB over 9 with the isotropic. That seems like a lot to pay \$375 for.

Tell you what I'm going to do. If you believe what you read in *A.R.'s T.J.*, just send me a \$10 bill and a stamped self-addressed #10 envelope and I'll send you an isotropic antenna.

Also, I see an antenna advertised for \$150 that claims to have a low SWR at all points across the 80/75-meter band. (Yes, it is a single-band antenna.) Funny, you can accomplish the exact same thing they promise with an antenna tuner, which you could use on all the bands. Or just cut two pieces of wire, one for the lower part of the band, one for the higher end of the band. You now have essentially two dipoles. Feed them in the center and you will have the same effect as the \$150 antenna. For saving you all that money, I will humbly accept your donation of \$5.

(1992 Note: So people don't think I'm a big meany, and since this is for posterity, I'm XXXXXing out the author's name and book title.

This is to protect the innocent — its author.)

Now we move to something that truly boggles the mind. XXXXX has come out with a book. At \$9.95 it is the greatest collection of misinformation ever compiled. Strange, because XXXXX is a really nice guy and has technical feats to his credit.

He says this book is for Novice Norman, and on the first page of text, tells him to dig a 50 cubic foot hole and put in an 8 ft. copper rod and a dozen quarter-wave ground radials for *each* band out like spokes in a wheel. First, who's got that kind of room? Second, you just frightened the poor kid away from Amateur Radio, and third, for what real purpose???

A couple of pages later you are told to run out a 135 ft. radial from your antenna tuner. How will this help your dipole?

A few more pages, (remember this is for Novice Norman), there is a discussion of a dual diversity receiver system along with analog switches, comparator and on.

The kid reading this figures he'll have to get to about 35 before he can even afford two HRO-50's and chucks the book in the trash can.

(But yet, there is nothing in this whole book on GMT or tuning up a transmitter.) XXXXX tells us that foam dielectric constant is .08 (ouch) starts to talk about velocity factor but never completes the discussion so no one knows what to do. He tells you to check out a chart that isn't there. The book is filled with typos and the spacing dimensions for the Yagi are wrong. XXXXX says that an antenna tuner only "fools" the transmitter and does not make an antenna work across the entire band. Wrong statement.

The type size in the book is very small and it is a constant irritation to see a lower case "m" used in place of the upper case "M" as it should be in MHz. He says the only place to measure SWR is right at the feedpoint. Wrong! Any point will be just fine.

He mentions the noise bridge, but never tells how to use it. Shows a picture of the Omega (not even sold any more), and doesn't mention the Palomar or the MFJ, which are far, far more useful than the Omega.

Due to typos, he tells that equipment was not capable of working on 10 meters, where there were the LORAN signals.

We are told that a sloper has 3dB gain. (relative to what?)

Novice Norman may go searching for the "transformer" that loads into fence wire for an antenna.

The Hustler antenna is written about with a lower case "H." If you are interested in shunt-fed antennas, you are told to find a May 1975 issue of *Ham Radio Magazine*.

The formula for a loop antenna is wrong. The inventor of the Quad antenna is called Claude Moore instead of his real name, Clarence Moore. And who really has switches on their Quads to go from vertical to horizontal polarization?

No dimensions or spacings are given for building a quad but you are told how to construct a remote base VHF station — just what Norman Novice wants to do tomorrow. And of course, this rank beginner is equipped with a "calibrated field strength meter that will give you the exact gain in decibels."

This poor unsuspecting beginner is told to start his construction projects at VHF because "parts are smaller" and "much less involved." Now, that will be real news to many!

And why, pray tell, is this "lowly little Novice" (as XXXXX calls him) given ground-plane dimensions for 110, 120, 130, 150, 160 and 170 MHz? Are there some ham bands there that nobody has told me about?

Many pages are devoted to boosting products that XXXXX sells, but in this beginner's book there is no mention made of any of the contests, where to obtain the periodicals, QSL bureaus, etc.

The book has analog to digital converters, decade counters, and on and on, but nothing on keeping a log. XXXXX says it is because of "Madison Avenue marketing boys" we have dummy loads instead of using the good old lightbulb. He tells you to tune out the reactance of the bulb by using a series capacitor. (Of what value, XXXXX?)

Here's a real gas. On one page is how to build a 2-IC tone burst generator and on the next page is

grid dipper with a TUBE! Just what you need, out working on your antennas trailing a wire back to the shack so you can get 150 volts for the plate and 6 volts for the filament of your 12AU7. XXXXX, you've got to be kidding!

And then, just what you've always wanted — a diagram for a crystal set. Then poor, hapless Norman is given a diagram of a 1-transistor, 1.5 watt, 40-meter transmitter and told, "You're ready to talk to the world." Well, Novice Norman may be ready to talk to the world but the chance of the world talking back is rather slim.

Then XXXXX, who really should know better, tells us that the smallest minimum volume change that the human ear can detect is 3dB. XXXXX, you've spent too much time around rock bands and they've ruined your hearing.

I could go on, but you get the point. People who write books about Amateur Radio do really have a serious responsibility. What they should do is let some other people read their book before they send it out to market. If one truly has sympathy for the already befuddled, one had best not add to their confusion.

There is a place for a proper beginner's book, one in which the new Novice is not pictured as some cartooney-looking kid or in which the author of the book is not pictured climbing up the top of a monstrous tower with 128 elements. Such makes the newcomer wonder, "Do I have to have something like that to talk to people?"

And if Norman Novice's lady sees the book with nine pieces of Collins gear on the cover and goes, "Are you going to buy all that, too?" there will be troubles in the household.

If anyone out there has a burning itch to write books about Amateur Radio, I'd certainly suggest you let as many other people read it before you embarrass yourself (and have Novice Ned pounding on the top of his receiver, trying to get it to work) with statements like, "20 meters. . . usually good 24 hours a day."

A few words about the sunspot cycle would be more useful than a half page about a liquid level detector or voting latch board. And I just can't imagine Novice Norman getting too excited about meteor scatter right off. One would be doing him/her a better service by telling about the ARRL Worked All States award.

(Kurt N. Sterba goes by that alias specifically so he can speak his mind, sometimes about people he likes, and still remain friends.) □

25

Lil Paddle

I say! Now even the usually proper *QST* has gone off into the land of make-believe. In an overly-long article outlining the search for an antenna that would exhibit broadband characteristics across the 80-metre band, the stately journal printed a most interesting SWR curve.

The notation read, "Curve B shows the SWR response of a broadband dipole discovered in the computerized search described in the text. This antenna has yet to be constructed and tested."

Why not, pray tell? Now, I shall spare you five pages of math, computer analysis, nine footnotes (one dating back to 1932), and tell you this: how to do it.

Simply, cut two dipoles — one for the low end of the band and one for the high end of the band. Join them in the center and feed them in the normal manner. It works!

Worldradio was sent a review copy of *The Radio Amateur's Handbook* and it was forwarded to us to comment on the antenna chapter. No, this is not the *ARRL Handbook* which we have all grown to know and love, but something put out by the giant Harper & Row Publishing Company of E. 53rd St., New York City.

Whoever supervised this book must have been mugged on the subway and never quite recovered. There is probably no worse way to spend \$12.95 than on this bad joke.

Out of 387 pages, only 21 are about antennas. SWR is never mentioned. The vertical antenna rates two paragraphs, and it is *NOT* mentioned that without *radials*, a vertical is horrible. This book takes up a full page to give you the Greek alphabet (really!) but can't spare the space to tell about radials. However, on the same page as the tiny text about verticals is a picture of a 27 ft. parabolic dish.

How so you like this sentence? "It is impractical to use full doublets on 40 and 80 meters, because these would require large-diameter tubing 65 and 125 feet long." One hardly can comment on that!

The discussion on beams tells you that "If a second dipole slightly longer than the basic radiating antenna is placed parallel to and a

critical fraction of a wavelength behind the latter. . . ." No actual figures or dimensions are given. *SOME* "Handbook" this is!

A picture of a quad is shown, but there is no text to explain that it has a full-wavelength loop, etc.

A picture of an antenna tuner is shown with this text: "Connected between a transmitter and almost any length of wire, this little matching coupler usually works wonders in coaxing signals out of the combination." Sadly, it is not explained *HOW* one accomplishes this feat. And wasn't that "almost any length of wire" just too cute? How about 12 feet on the 80-Metre band?

The reader of this book is told he may acquire an "antenna analyzer." What on earth is an "antenna analyzer?"

At my age, I shouldn't let things upset me so, but when I read that amateurs are "bouncing their signals off" satellites it almost makes me say naughty words.

The amateur satellites receive signals and retransmit them. "Bouncing" signals was last done with a balloon called "Echo" back in the '60s.

In a book copyrighted in 1983, we're told, "Most amateurs use a method of voice modulation known as amplitude modulation (AM)." Also, you get first notice here that Extra Class amateurs have exclusive rights to 14,000-14,205. (I wish it were true.)

Probably the least harmful advice in this travesty is, "When going to take the FCC test, make sure you have a loaded fountain pen." *Fountain pen!* Even I don't use one any more.

Now, if you have ever wondered why there are so many "Kerchunckers" on 144, it is because they have read earlier editions of this book in which you are told to "Press the push-to-talk button on your mike and release it. If you hear a rushing noise that lasts about half a second, then press the mike bar again and start talking." Excuse me for a moment — I have to go take some pills.

However, this tome does solve the question of why you hear so many rotten signals on 2 meters — prior readers are talking into their loudspeakers as per the advice given.

Tears practically came to my eyes when the trusting reader was told to go on the air with, "Hello CQ, CQ, CQ, CQ, CQ, any 20-meter phone, CQ, CQ, CQ, this is..." and then the whole thing is repeated with that total abomination "any 20-meter station" etc. Just who do you expect to answer you when you are on 20? A 6-metre station?

This is unbelievable. . . when you release your mike switch after the above, your "carrier will go off the air."

The author states, when talking about the ICAO phonetic alphabet compared with the older one, "this offers no advantage..." WRONG!! The Alpha, Bravo, Charlie, Delta, instead of Able, Baker, Charlie, David, was the subject of intense testing. This was done by the international airlines which has a rather high interest in all parties understanding each other.

First, they wanted words that all peoples of the world could SAY. Then, they ran the word lists through to people with noise introduced to see which words could be best discerned during poor conditions. Use It!

The photographs illustrating mobile operation bring back memories, but I really don't think there is an Elmac transmitter in any amateur's car today.

Another photograph is obviously an advertising PR picture, because I have serious doubts that anyone with a Knight-Kit receiver worked DU, VK, ZL, G, PY, EA, FP, YV, and more as the QSL cards on the wall would indicate.

The author relates a pointless anecdote about working England, Germany and North Africa from a mobile station in New York City. Later, while parked on a Denver hill a full mile above sea level, he shouted himself hoarse without getting a single reply after more than an hour of "dial twiddling." Why not explain how come?

Then we get some babbling about two stations using the same carrier frequency without interfering with each other, because one is on USB and one is on LSB, and this is "actually equivalent to doubling the width of the ham bands!"

My question is: what band is it that this occurs on? With so much left out of this book, why spend the space talking about "hand capacitance"

which no one any younger than I can even remember?

I could go on and on. You may ask why do Kurt and I lash out at such books? First, we don't think such sloppy and slipshod work should be purchased when there are such things as the *ARRL Handbook* and the *ARRL Antenna Handbook*, as well as Bill Orr's *Antenna Handbook*, which are highly professional indeed.

We believe books are precious things. Books are forever. People will throw away magazines and newspapers. They will keep books. Therefore, the level of responsibility on the part of book publishers is far greater.

I see the cover picture of *CQ* has someone totally befuddled in trying to put up a dipole. No joke. Not his fault. He just read some of the books on the market today that added to his befuddlement. I'd suggest that before anyone attempts to write a book about this hobby, they go out and teach a licensing class so they can relate to what it is that a new amateur wants and needs to know.

The August 1983 issue of *CQ* does have some very interesting ideas in it — recommended. Probably one of the most important things in their special antenna issue is the ad on page 121 for the Palomar Noise Bridge. Anyone seriously interested in antennas should have one, or they are just kidding themselves.

An admonition is in order. Should you be one of those who write to *Worldradio* to complain that something we say is wrong, please approach it scientifically. You should say *HOW* we are wrong and how you are right. Name your references, (Kraus, Jasik, or even Maxwell) or quote from your own experimentation. Certainly you should clearly identify what it is exactly that you are referring to. A simple "they're wrong" is exactly that — simple.

(Lil Paddle goes by her alias for a very good reason — to protect people from themselves. This way she can go to hamfests and club meetings without someone coming up to her and arguing with her. She then would whip her slide rule out of her purse, prove the challenger wrong, and send him home crying.) □

Kurt N. Sterba

The publisher of *Worldradio* has informed me that the author of a book I reviewed in the August issue called him up to complain.

I was called "unfair" and told that I had taken things out of context, and many people had called up the author to tell him what I did wasn't right. OK, I apologize.

It really isn't any business of mine if any amateur wants to dig a hole big enough to stand in, which will make absolutely no difference in his signal. Why should I care? Considering the number of hams who are "center-loaded," maybe a little physical labor would do them some good.

Worldradio got a couple of letters accusing me of taking "pot-shots." To those folks, all I can say is, start your search for a "calibrated field strength meter that will give you the exact gain in decibels."

I've been told the author was offered space to rebut what I said, on a point-by-point basis, but declined to do so. And I think it's very nice that he has friends so loyal they would call him with support when he says an antenna tuner only "fools" the transmitter.

Pray tell, anyone, how is a transmitter "fooled"? Does the antenna tuner go "Yoo hoo, transmitter, you think you are looking at 50 ohms but you're not! HA HA." Does the impedance wear a Halloween mask?

I shall present an analogy. Coming out of your wall is 120 volts. But the plates of your amplifier take 1,500 volts. To change the voltage, a transformer is used. The voltage change ratio depends on the winding ratio. Have we "fooled" the plates? Obviously not. It really does have 1,500 volts. Truly

What else has happened? We also have an impedance ratio as the result of the turns ratio.

Have we actually *MATCHED* the plate impedance, or have we "fooled" the plates?

That is why it is an absurdity when, in the August 1983 issue *QST*, a writer said the transmatch "disguises" the impedance. (Does it wear a wig? A false moustache?) No. We actually have a transformer that *IS* matching. Thus the name transmatch. Such a box in some circles is called a "coupler" because it couples the power. The vast majority of hams weren't around when we had one winding of a coil on the output of the transmitter and another winding feeding the antenna. We called them RF transformers, and they matched the tube to the line.

I will tell you this. If you have an antenna tuner (that can handle the range), and you have a 7 to 1 mismatch at the point where the feedline meets the antenna, and there is a 100 ft. run of RG-8/U in between, you will lose one-fourth of an S-unit over a perfect match at the top. Yes, a whole quarter of one S-unit.

Oh, I'm sure there is some wailing and gnashing of teeth — all from those who refuse to look at the charts in the books. But then, I am not Moses trying to lead the tribe out of the wilderness. Thus, to spare *Worldradio* the abuse from people who will caterwaul, "How could you say something in *QST* is wrong?" I shall retire from writing this column. No more controversy. No more hurting other's feelings. No more truth getting in the way of cherished assumptions.

I'd like to thank the many who wrote in over the past two years. When you find yourself getting beaten out in the pileups by an HW-7, that's me. Adios and Arigato.

(With the greatest regret we see Kurt go. Iconoclasts are rare. The best to you, OM. We shall attempt to find someone to answer questions that come in.) □

To keep you, the reader, alert, eight inconsistencies have been purposely included in this book. When you find one, you, too, can say, "Aha!"

Kurt N. Sterba

My dear friends:

All of your letters were forwarded to me, and I must say that I am touched more than I can ever say. Hams are indeed wonderful people.

I was so disgusted by the erroneous information being published elsewhere, I no longer wanted to be a part of the printed press. You have convinced me, with your eloquent letters, that my decision was not a good one.

What put me back "in the harness" was concern about commercial products now being sold. You may certainly buy what you wish, but I must warn you that some of the advertising material is in error. I'm talking about antenna tuner devices that are mounted at the antenna feedpoint.

I shall quote from the material. "Antenna Tuners. . . what they can do is transform the impedance and reactance that you have at the station end of the coax, to make it look like 50 ohms for the transmitter and receiver. This may be helpful to a degree, but it still does nothing to correct the mistuned and mismatched condition at the antenna!"

WRONG! WRONG! WRONG! One would think that after all these many years, people could finally get it right. Not so, apparently.

What makes it worse is that the charts which explain the true happenings are in the books. One does have to look at them, however.

If one is so inclined, he can look at the chart, see the type of cable he is using, take into consideration the length of the line, see what SWR he has, and see the resultant actual power loss.

Next, here is what the poor maligned tuner actually does. Whatever the reactance is coming down the line, the opposite reactance is sent back up. We have balanced it out. If you have a lot of negative coming down, positive is sent back up. That's it!

The actual difference — when using cable lengths as in the amateur service — between having the tuner in the station or at the antenna, is so slight as to be called meaningless. There is absolutely no point in doing anything in which

the difference cannot be heard at the other end!

The above discussion is based on the assumption that your antenna is already somewhere close to reality. If you have 20:1 to start, I have nothing for you. Even in mobile work, look at this: The cable run is so short, no loss worth speaking about can develop.

I just don't want to see anyone going through a lot of extra expense and trouble when it is unnecessary. Keep your tuner where it is — down next to the transmitter.

Recently, in one of the hammags, I saw some sort of monster cage antenna that was designed to get a broad-banding effect on 80 meters. There was more wire in that than on the Brooklyn Bridge. Again, a case of overkill. There is no need for all those spreaders, weight, expense and captured birds. Just put up a dipole and run your tuner. That's all you need!

For doubting Thomases: Run a test. Have some other station listen for you at the top of the band and the bottom of the band. Have a chart made up with the different frequencies. With the memory rigs, you could even preset the frequencies on the rig. Scoot back and forth. There will be your proof. Some will become very ashamed when they find out that what they've believed all these years is *WRONG*. As we used to say, "Sorry 'bout that!"

The proper way to conduct the test is *NOT*, as you see (or hear) so many doing, by talking — "Hello, One, Two, Three," etc. Big Joke. Go "key down." Let the S-meter give you a good solid reading. Write it down.

Testing is scientific — just believing is not. Send in information on other tests you have conducted, and share your knowledge. Also, any questions you may have will receive an answer.

I was deeply moved by the number of letters and the sentiments expressed. I've got something interesting planned for you soon.

(Kurt N. Sterba goes by his cover name so that he will not be bugged by jealous types. To get him back, we had to pay him twice as much as QST pays contributors.)

□

Lil Paddle

I'm back, too! I really thank the many of you who wrote in to *Worldradio* asking that even if Kurt stormed off in a huff, could Lil stay on.

I, too, did read the book that started the whole incident. Sometimes I peek at the end to see how it comes out. On the very last page in talking about Amateur Radio that book said, "Its roots are deeply imbedded in C.W. as that was the only means for the original amateur radio operators to communicate." That is simply just not true!!

The original amateurs used SPARK! My father would let me watch. It made the air smell funny. There was no CW until tubes came along. CW does not mean Morse code; it means continuous wave, or one of constant amplitude. The spark wave tailed off. That is why radio operators were called "Sparks," because they made a great big spark. One could build a transmitter with the spark coil from an automobile.

Then going a few more pages back into the book, in a discussion of the Class C amplifier I saw, "It is the backbone of most solid-state RF amplifiers in use today." For FM, yes, but (which was never explained) for SSB, another great big NO! Wrong again.

After starting on page 168 and going back to 154, I decided the rest must be more of the same and quit reading. Kurt, as you know, had to torment himself by reading the whole thing.

Then we were quite surprised that we didn't hear from the Newington News or. . . what's his name, Jug McGraw? when Kurt demolished the statements in their article.

We think someone knows who we are, because on Trick or Treat night when I answered the doorbell, there was a 6-footer, weighing about 200 lbs., wearing a three-piece grey pin-stripe suit and a dime-store Halloween mask. All he said was, "I'm 50 ohms disguised." and he quickly ran off, laughing. I do hope he will be a good sport and not tell anyone else. I must say that he does have a good sense of humour.

Kurt and I have been married a year now and I'll tell you, life with him is quite bizarre. To see

those skinny legs sticking out of those baggy O.D. shorts when he does the clean and jerk is really something. Yes, Olive Drab underwear. So old and thin.

I've tried to bring some civility to his life, but it hasn't been easy. I did buy him some decent linen. But he made me take the ones with the red ants on them back to the store. He is so square he calls Lawrence Welk music "be-bop." When I listen to my Ted Heath records, I've got to do it with headphones plugged into the stereo.

But on to the transducers. There are those who say they won't use the antenna tuner because they "don't want to lose any of their power in the tuner."

Should you possibly be one of those chaps, or know someone who is, ponder this or ask them: Just what does absorb the power in the tuner — which part? Remember, only resistances consume power.

Now that we're back, remember, if you have any questions, send them in and you'll have an answer. Also, if you have a bit of information you'd like to share, this is the place.

As so many amateurs are using vertical antennas, the following by Jim Lisson, WA2CEP, should prove of great interest.

The vertical antenna feed

Let us take a look at the hypothetical short vertical antenna for one of the low frequency HF bands. This imaginary antenna will have a complex feedpoint impedance of 20-J300 ohms. This means that it will "look like" a 20 ohm resistor in series with 300 ohms of XC, from its lower end to ground. The value of this complex impedance will be determined primarily by the electrical length and diameter of the antenna.

We could put 300 ohms of XL in series, with this antenna at its base, and then — on paper — it would "look like" a 20 ohm resistive load. Actually, let the loading coil have a loss resistance of 5 ohms, and because I only have two 8 ft. ground rods and two radials for a "ground system," let the ground system loss be 20 ohms.

If we now measure the feedpoint impedance we

will “see”: 300 ohms of XC (the antenna), 20 ohms of resistance (the coil) and 20 ohms of resistance (the ground system), all in series. This antenna, with its ground system, will now “look like” a 45 ohm resistive load. We can now feed this antenna with 50 ohm coax and have a good SWR. With a “good SWR” the antenna *must* be working? *If you think so, read on!*

If we simplify things and just look at the resistance ratio, we can see that with 20 ohms of radiation resistance and some 25 ohms of loss resistance, of the power that arrives at the antenna feedpoint, just *under* half will be radiated and just *over* half will heat up the loading coil and “warm the worms” under the antenna.

The first thing we will want to do is put a good “ground system” under this antenna. Because all of the current — from all parts of the ground system — must converge at the base of the antenna, the more wire we lay *near* the antenna the better. By this I mean that if we have 100 feet of wire, then ten 10 ft. radials are better than two 50 ft. radials. All the books say “more and longer.” The emphasis should be placed on the word “more.”

Remember that the current *density* decreases as we move away from the antenna base, and the rule of diminishing returns comes into play at about the point that the radial length equals the height of the antenna.

If we have a 40 ft. vertical antenna for 80 meters, we could use a few 120 ft. radials. It would be better, however, to use twice as many 60 ft. radials, or even three times as many 40 ft. radials. Don’t confuse this ground-mounted antenna with an *elevated vertical*. With a quarterwave 10-meter vertical antenna up on the roof, we may use only four quarterwave radials, or perhaps make them a bit longer and slope them downward. This antenna will now start operating like a vertical, center-fed, halfwave dipole and the “ground system” requirements have changed.

About those “ground rods” that I used. Even if they enter into “moist” earth a few *feet* below the surface, they won’t be of much help because most of the RF currents returning to the base of the antenna flow within the first few *inches* of the surface. Other than for lightning protection, ground rods are of miniscule help and the antenna, as I have described it, is not even grounded anyway!

Now that we have put in a good “ground system,” let us say that the ground loss changed from 20 ohms down to 5 ohms. The new ground

under the antenna *will* change the complex impedance of the vertical radiator, but let us say it is the same. The loading coil still cancels out the XC of the antenna, and the total loss is now 10 ohms — 5 ohms for the coil and 5 ohms for the ground system.

With 20 ohms for the radiation resistance, the antenna will now look like a 30 ohm resistive load. The SWR will now not be as “good” as it was, but the antenna will work much better. Of the power reaching the antenna feedpoint, some two-thirds will be radiated and some one-third or so will heat up the coil and keep the “worms warm” on those cold winter nights.

From this we can now see that the SWR does *not* tell us how well the *antenna* works. In this case, the antenna got better and the SWR got worse!

I still have the ground rods out there in my yard at the base of my antenna so let’s make some use of them. What we will do is decrease the XL of the loading coil so that the complex impedance looking into the antenna “looks like” 30 ohms of resistance in series with some net value of XC. If we chose the proper value for this series XC, then when we convert this series RX equivalent circuit into its parallel equivalent, it will look like a 50 ohm resistor in parallel with some new value of XC.

If we now put second XL (coil) between the bottom of the loading coil and the system ground and make its XL equal to the new parallel XC, it will be in parallel with that XC and will “tune it out.” The 50 ohm feedline will be connected across this new second coil and this feedline will “see” the 50 ohm load of the antenna plus its matching network.

Note that these two coils are in series, and in most cases, they are combined into one coil. Also note that the vertical antenna now has a “DC ground.”

This same matching system is shown in most antenna books. They will have us put some coil from the bottom of the antenna to “ground” and tap the coil at some point for the feedline. Then we will adjust the number of turns of the coil and the point of the tap for “best SWR.” With a good ground, all of this works just fine, but with no ground or a poor ground, all you will have for your effort is a “good SWR” and “contented worms.” — *The Carrier, Mt. Diablo ARC, CA*

I end with this tip for the newcomers. When trying to find the right setting for your transmatch do this: set the Transmitter Matching capacitor halfway between all the way open and

all the way closed. Do the same with the Antenna Matching capacitor. Then rotate the Inductance switch through the various click stops. What you are looking for is the highest level of background noise. When you find the maximum level, start fishing around with the two capacitors to find the lowest reverse reading along with the highest forward reading on the SWR bridge or power meter.

I write this a week before Sweepstakes. Kurt

says he is going to win again. I tell him he is too old for that. He shows me some faded yellowing certificate to show he once did win his section. I think he saw Rocky too many times.

(Lil Paddle goes by her silly name [which really has logic behind it] to avoid autograph seekers, the IRS, love letters from former Lancaster pilots and crank letters from reprobates who resent the fact that a woman has an Extra Class license.)

29

Kurt N. Sterba

Since I always enjoy a challenge, during Sweepstakes I decided to test what could be done under non-optimum operating conditions.

I took a Spider vertical antenna and put it on a desk in the shack. I had to take off the 40-meter resonator, as with it in place the antenna wouldn't fit between the desk and the ceiling. So now I have an antenna that is all of 4 ft. 5 in. tall.

The shack has five window screens, which I left in place. (It was too cold to go out and take them down!) I figured this would be a real torture test... an indoor antenna, window screens slurping up the RF, and I used an old rig of mine that measured a huge 50 watts output on 75.

What happened? I made two contacts in two minutes and three contacts in four minutes on 15, and four contacts in five minutes on 20. Later I took the antenna off the table and put it on a chair; that way I could put the 40 resonator back on.

Things had gone so well, I decided to do something really ridiculous. As there is no 75 resonator on the Spider, through a tuner I loaded up on 75 meters. I worked two stations, each about 400 miles away in opposite directions.

The end result — I worked every U.S. call area and one or more stations in every ARRL Division except Canada.

Certainly a beam antenna up 50 feet it is not, as switching back and forth on receive would sharply point out. But for what it is, it does very well, as I found out. To work every corner of the

United States in a contest with an indoor antenna shows that the folks at Spider have done something right. The only thing we could suggest is that they come up with some bracket-type device so that one could make a dipole antenna out of two Spider verticals. That way, one would not be dependent on a ground system and avoid the losses associated with an inadequate one.

I see that the *Newington News* has gone back to saying "the SWR was disguised by means of a Transmatch." Where is that Walt Maxwell when they need him? I really don't want to beat this horse anymore, but for those who may have just joined us, a transmatch truly does what its name says: it MATCHES!

The writer of the article said (in referring to transmitting on 30 meters), "I was surprised to find that any HF band antenna would bring reasonable results" (when using the transmatch).

Well, if you had been reading old Kurt, it wouldn't come as a surprise. He also went on to say, "I was pleased to learn" (all I can say is, it's about time!!!) that his tri-band Yagi "would radiate well" when it was fed 30-meter energy when using a transmatch. Just what earth-shattering revelation will we be treated to next? FLASH! CW will get a message through where AM won't.

Now, here are the actual facts of the matter — an antenna tuner does truly TRANS-form one impedance to another. It doesn't fool the transmitter or any such nonsense. Every broadcast station uses a matching network to MATCH the output of the transmitter to that of the antenna. It

doesn't FOOL or trick the transmitter it MATCHES!!!

Here is what really happens: If the antenna is too short (capacitive reactance), the tuner adds inductive reactance. If the antenna is too long (inductive reactance), the tuner adds capacitive reactance.

You could say it "balances" out, or you could say you have "neutralized" it. What has happened is that you have truly compensated for the effect originally found. It works — it works well.

The same article, in talking about the inverted-V, said, "The enclosed angle should be about 90 degrees." Oops! Anything under 90 degrees will start cancellation.

Then we were told that angles up to 120 degrees provide good results. Well, how about more than 120 degrees? After all, the everyday dipole is 180 degrees.

Unfortunately, all the tub-thumping and chest-beating by the ARRL at the various conferences about the technical wizardry of the amateurs was thrown to the winds when this article mentioned that amateurs had written in asking for dimensions for antennas for 10.1 MHz. OUCH! They should have buried that deep. Do not wash your dirty laundry in public.

Maybe we should have "weighted" FCC exams. The question on how to determine the length of an antenna counts 51 points and 49 other questions count 1 point each.

Another article in the same issue, in talking about an SWR of 3.49 to 1, stated, "A Transmatch will make these impedances acceptable to the transmitter, but I do not like them!" I certainly wish he had told us why not. It won't make a jellybean worth of difference.

I heard an amateur on 75 phone say he would like to put up a 138 ft. flat-top, but he only had 130 feet of space. Gadfry. Let 4 feet hang down on each side, or cut them off altogether. The truth of the matter is, you could cut off *HALF* of the dipole and you'd lose only about 30 percent of the field strength. Since it takes 50 percent loss to drop 3dB you can do a lot of giving up before anyone can hear the difference.

What some should do is learn to talk. About a third of the guys on the air sound like they are smoking cigars and chewing peanuts at the same time. The best "speech processor" that a lot of people you hear on the air should get is plain articulation. Some of these homebrew phonetics,

whew! Hmmm, was that "babble dabble" or "dabble babble" or was it "apple gabble?"

The huge number of letters that came to *Worldradio* were all forwarded to me. I was surprised to see so many of them were from fellow two-letter call holders. Thanks for welcoming me back. I hope I will always be worthy of the sentiments that were expressed.

Don't forget, you're invited to send in the findings of your experiments. Questions will be answered.

Here's a little trick: If you only have room for verticals and not much for radials of any significant nature, put up two verticals and feed them both. Now, this is not the usual phased verticals with delay lines. This is just two verticals, put up where you can get them. Yes, the impedance will be half that of one alone. Run the two feedlines to a "T" connector and from there to your tuner. Such a set-up should cut your loss (from inadequate ground screen) in half.

Here's something that is — as John Reddie, W7KJ, says — worth a try.

Sometime when you have nothing better to do, try this: take your spare antenna (the vertical or random wire, say), and route it through your backup receiver or transceiver. Run the audio into your right ear via stereo headphones — or split cannonballs. Mute it with a footswitch. Run the audio from the regular antenna and transceiver into your left ear. Whadda you get?

1) Dual receive — with all its interesting possibilities.

2) Dual Diversity — great for QSB on both ears, but often it is out-of-phase, resulting in a steadier "average" signal with improved readability. It really works!

3) All HF antennas have nulls, and Dual Diversity helps a guy find out more about his. However, be prepared for frustration when something really juicy shows up and you can only hear it in your right ear — the one you set up for 'Receive Only!'

4) Dual Diversity gives aging veterans playing-time under actual game conditions. Morale is improved, electrolytics are rejuvenated, relay contacts wiped clean, and the shack is warmer.

Rather interesting, don't you think? When it's my turn again, I'll have some data on antennas

for very limited space. Next month, Lillian will share some interesting observations. By the way, how many mistakes did *YOU* spot in the latest edition of *All About Cubical Quad Antennas*?

(KNS goes by his disguise for the same reason Zorro did — to fight injustice [bad information], defend the truth, and because — with advancing age — he finds his jab is slowing down.) □

30

Lil Paddle

One thing I have to agree with Kurt on is his opinion about the “Spider” antenna. I duplicated his test conditions exactly and went into the ARRL 10-metre contest.

In the limited time I had to spend in the competition, my results were: twice I had four contacts in a five-minute period; also three in three, four in four, four in five and six in seven. My most distant contact was 6,000 miles away. This was done with a key down power of 40 watts. Remember, we are talking about the antenna being used INDOORS.

One letter said we should tell more about the noise bridge. Great device indeed! You can check out if your SWR bridge is truly accurate. Find out if your dummy load is what it is stated to be. You can cut your quarter-wave matching stubs with confidence, not depending on published velocity factors which can be off. You can measure inputs and outputs of anything. Anyone who doesn't have one is just kidding himself.

Let's move to another vertical antenna, the well-known Butternut. I've also used one of these. But this time let's let someone else give a report on the results. Here's Robert McKay, N8ADA:

The Butternut HF-6V is a high efficiency unguyed 10-80-meter vertical system (including 30 meters) which can become a 10-160-meter antenna with the addition of an optional resonator. No switching is required to cover the bands. The antenna is unique in that it uses no traps, but does use resonators and some very ingenious engineering to provide the all-band coverage. The entire 26 feet radiates on all bands.

The antenna breaks down into sections short enough so that it will fit into the trunk of the average size car, making it a good vacation antenna. Butternut also makes this antenna in

an export model which comes in even shorter sections for greater portability and would fit better in a compact car.

We took one to Seattle last summer and worked Dayton with 100 watts almost daily on 20, and many times at night on 40. For a Midwesterner, it was a real shocker to have FO8BW (Tahiti) come back to a CQ one evening on 20. We have used it on all bands except 30 meters, with very good results.

Like any vertical, a good ground system is essential. For those mounting an antenna on a roof or where a ground system isn't available, the manufacturer also sells a set of stub-tuned radials made from 300-ohm lead-in that provides an adequate groundplane.

On return to Dayton, the antenna was mounted on a one-story house in a very poor RF environment. Problems were experienced with high SWR, so a sketch was drawn of the installation and a set of SWR curves sent to the manufacturer. The vertical is not far from a TV antenna, a dipole and a tower. Five feet under it are many square feet of ungrounded aluminum foil insulation and the outside of the house is covered in aluminum siding. How all these things might affect the antenna was a major concern.

The answer came back in a few days — two complete typewritten pages, analyzing the situation on a band-by-band basis. Without a doubt, the best and most complete answer I have ever received from any manufacturer anywhere.

Incidentally, their first suggestion covered the problem, and everything else fell into place. They are really interested in customer satisfaction.

A 160-meter resonator was added in July and the first evening with 100 watts we worked Arkansas, Long Island, South Carolina, Pennsylvania and Michigan, receiving good signal reports from all. This was all in an hour and July is not prime time on 160.

As you would expect with a short antenna, the bandwidth on 80 and 160 is somewhat limited.

However, an antenna matching unit (tuner) will allow you to move about the bands and still keep your finals happy. The addition of the 160-meter resonator reduces the normal bandwidth on 80. We didn't check it on 30, but have no doubt it would have been almost flat. As installed, the SWR on 10 meters is a little high, but we didn't work on it as we usually use a beam on 10. A little adjusting would have brought it in.

In summary, for city dwellers or anyone who has very limited real estate, this antenna will give you excellent all-band (10-160) capability in less space than anything we know of. Even those with other antennas will find it very useful when signals are coming in with vertical polarization. If you have given up ever operating on 160 for lack of room, here is the solution to your problem.

Would I buy another? Yes!

Rather impressive wouldn't you agree? I have only one slight disagreement with the excellent report.

At HF frequencies, signals are not vertically or horizontally polarized based on what axis the transmitting antenna is. (At VHF line-of-sight, such is true, but not at ionosphere propagation of HF.) It is just a big jumble — some of this, some of that, some in the middle, all twisting and turning around.

What is truly more likely to be the actual case when comparing signals on a horizontal vs. a vertical antenna, is the angle of radiation of the incoming signal. Based upon the conditions found at the average amateur installation, the dipole will react better to incoming high-angle signals and the vertical better to low-angle energy.

This would be a good place to clear up one widely stated misconception. Much is bandied about regarding the superior low-angle transmitting capability of the vertical. Such an attribute is dependent upon a good radial system. Without it, the claimed properties of the vertical do not exist. In fact, without a proper radial system, the exact opposite of what one is striving for with the vertical will occur.

For the newcomers, I should mention that the

virtue of a low-angle signal is that it takes fewer hops to get somewhere and thus less absorption on its way to the intended receiver. Also, under marginal conditions, the high-angle signal will just go up and pierce the ionosphere while the low-angle signal will carom off the layer and end up at some DX station's shack.

The Earth absorbs more signal than the ionosphere, and an ocean path between two stations is best.

Should conditions at your QTH restrict you to a vertical and you cannot lay out the optimum ground system, do not despair. Try to run out as many short radials as you can. Scrap aluminium plates can be of help. In a portable/temporary situation — camping out, Field Day, etc. — sheets of Reynolds Wrap may provide a solution.

With a ground screen in place, the energy that would otherwise be lost is captured, flows back to the feedpoint and is radiated.

Any metallic surfaces in your habitat (chain link fences, gutters, sprinklers, towers, masts, other antennas, et al) should be part of your earthing system. It's a lot of little things that can give your signal that tiny bit more that gets you up out of the noise level and turns it into a copyable signal.

Catch everything you can — a metal desk in your shack, metal patio cover, a garden tool shed, washers, dryers. Search out everything metallic you can find and use it. As you know, there are times that half an S-unit can mean getting that multiplier or not.

When you beat your buddy out in the contest by getting a few more contacts times a few more multipliers, don't tell him how you did it. Let's keep it our secret.

If you want to check out your SWR bridge, reverse the input and output lines, and see if the readings are the same on the different scales.

(Lil Paddle goes by her moniker, among other reasons, in order to protect the identity of Mr. Paddle, who will be here next month.) □

To keep you, the reader, alert, twenty inconsistencies have been purposely included in this book. When you find one, you, too, can say, "Aha!"

Kurt N. Sterba

Many amateurs living in apartments or other antenna restricted quarters have a rather tough go regarding the radiating of a signal.

Here is one solution. From the ceiling, hang a square loop of wire about 8 ft. 3 in. on a side. Cut in the middle of one side and feed with coax. Exactly opposite from where the feed is, cut the wire and separate it with a couple of inches between the ends. What you have is half a quad loop, or a dipole made into a square.

The impedance will be quite close to 50 ohms, and the slight loss of signal strength — compared to a regular dipole at the same spot — won't be enough to notice. The dimensions above are for the 20-meter band. You may scale up or down to the frequency of your choice.

If you have enough room, you could make the loop one full-wavelength (closed loop), but remember — if the loop is horizontal, the radiation will be straight upward. Speaking of signals going in the direction we don't want. . . with the sunspots going into hiding, many operators are going to the lower bands (which get better when higher bands get poorer).

A chap with an 80-meter dipole up about 65 feet thinks he has something. What he really has is the same radiation angle as he would have with a 20-meter antenna 16 feet high. And you know what that will do for you! Or put another way, think about how competitive you'd be with your 10-meter antenna up a whole 8 feet above ground. Such is only for masochists.

So, what is the solution, you may be asking. If you already have a 135 ft. flat-top, from each end add 76 feet of wire. Bring them together and solder. You now have a triangle. Feed the loop at one end of the top with the shield going to the horizontal wire. The center conductor goes to the descending wire. Now your main lobe will be at 20 degrees instead of 90 degrees.

If the above should be impossible for you, turn the whole thing upside down. For example, if you have an inverted V up, keep going and turn it into a full-wave loop.

Feed it at one corner. To find the length, take the number 1005 and divide that by the frequency in MHz. You will have (in feet) the loop dimension. It is not totally necessary that it be a perfect triangle. Run the different sides in whatever manner that fits. You'll find a lower noise level, and as so many who have loops say, you'll work 'em before and after others can't.

For the 160 buffs who don't have the room to put up a full-wave loop, put up the 80-meter dimensions and add loading coils in each leg. Use the largest diameter that is practical. A starting point is, for every foot you are compensating for, it takes two feet of wire in the coil.

The imaginative will realize that 40-meter dimensions could be "loaded" to radiate on 80.

Also, in a pinch, you can get on 80 by placing a coil at the end of your 40-meter dipole with a couple of feet of wire coming out each end for trimming.

To another subject: Have you ever noticed that if you work an old-timer who has a flat-top fed with open wire, he always has a good signal?

If you would like to emulate him but don't care to tear off part of your roof so the open wire can come into the shack, here's what you do. Run the open wire to a convenient spot and put a 4 to 1 balun on the line. Then run your coax to the one side. If you have a tuner, you can dispense with the balun.

Lots of excitement about talking to the astronaut. Good publicity, but it was rather a technical yawn. Actually, all things considered and put into perspective, it was kind of a copy trick done 40 years ago. Yes, I said 40 years ago.

During the unpleasant time when the DLs were not our friends, Allied radio operators were parachuted into rather hostile territory. (Talk about a tough DXpedition!) Using HF radio was, due to outstanding triangulation and tracking, highly dangerous.

The solution was a very low-powered VHF transmitter that wouldn't go very far on the ground but would go a long way UP. A swift airplane, made of wood (so it wouldn't show up on radar), would fly many miles up above the agent.

Contact would be made and then the radio operator would feed his message which would be taken down on a wire recorder aboard the aircraft.

One might say, the more things change, the more they stay the same. Forty years later, same thing.

The little transmitter, not much bigger than today's hand-helds, was called the "Joan-Elinor" after the English girlfriends of the two Americans who worked out the idea.

Back to today. Should you have hostile neighbors, but a bit of room in your yard, a one-wavelength wire end-fed and snaked around your fence will radiate better than you might think.

Over this last month, we had several readers write in with questions; all received a personal reply. Please be patient as the letters are for-

warded to me, and then I send them back to California for mailing.

We're pleased to answer any questions you may have. I must again thank all those who are still writing in about our return. To say I'm touched would be an understatement. And it was with great pleasure we heard from WB5IIR. There's a guy who really knows his onions... and his antennas, too.

(KNS goes by his disguise in order to protect the true identity of Lil Paddle, which is done to protect people who might argue with her at a club meeting. A little old lady with tennis shoes she is not. The spiked shoes of the Ninja are more her style.

For those who write in with their guesses, you are all wrong. KNS is not Lou McCoy, Bob Heil, Bill Orr, Dennis Wholly or Hashafisti Scratchi.)

□

32

Lil Paddle

A letter from a reader tells us that Kenwood states that one should not use his 430 unless the SWR is below 1.5 to 1. That's just plain ridiculous!

If the rig had any decent circuitry, the power would back down at the proper ratio. There was another rig that at 2 to 1 would find the circuit breaker opening. More bunk. What these manufacturers have done is make their radios inoperable in an emergency, when circumstances may well be less than ideal.

Have we indeed, with these no-tune radios, taken a step backwards? In days past, we had "tune" and "load" controls between the tube and the antenna. That way, we matched the impedance of the antenna. One dipped the plate and peaked the load. The network was indeed an antenna tuner, or matching device.

Thankfully, no one in those days ever uttered the foolishness of, "Oh, the Pi-network just fools the plate." Today, you will hear people say the antenna tuner doesn't match the antenna; it just fools the transmitter.

Possibly along with radios, people have also taken a step backwards.

Rigs of days gone past would state in the accompanying literature that they were capable of, let's say, 25-100 ohms. They would have been capable of more, had the manufacturers wished to build the network with more range. Such a plan, though, would have needed more room and the radios would have had to have been larger.

Today, with no matching network built in, one must — if encountering an antenna system that deviates but a bit from perfect — use an antenna tuner.

Our latest letter writer relates that he could not, when using the Kenwood AT-130 tuner, get the SWR below 1.7 to 1. That would indicate that the tuner has a rather limited range over which it can work. One should be able to, with a good tuner, get the SWR down to 1 to 1 on practically anything. Having never used that particular tuner, I cannot comment on it directly.

But with others, and having experimented at great length myself, and also having watched some of Kurt's madness (including wrapping a

coil of wire, two wavelengths long when stretched out, round and round a hula hoop, which he succeeded in spanning the continent with as it hung on a door in the shack), I can say that everything was able to be matched down to the 1 to 1 level.

The controls have to be moved slowly. If they are turned too fast, one will pass the matching point without knowing it. With some loads, the matched point will be but a sliver. It is also a "going back and forth" process — first to the transmitter side, then to the antenna side, then back, etc.

If you seem to be close, but it just won't get down all the way, try one setting higher or lower on the inductor.

If you should be in a situation such as one amateur, writing to us, stated: "indoor, third floor, no ground, a mobile antenna," do not despair. Use a jolly antenna tuner. On the back of the tuner, where there should be a ground lug, fasten some wire — one quarter-wavelength long — at the frequency you wish to operate.

No it does not have to be stretched out. You could even run a wire to the cold water pipe in the loo, disconnecting it when not using the radio. For it is sad, but true. A vertical without a radial is, to quote President Harry Truman, "manure."

Purists may wish to use the Belden 9913 50-ohm coax. It has half the loss of RG-213. So it is more expensive. How much did you pay for your amplifier? Why throw the power away?

For those restricted to indoor verticals and having a rough go of it, try two verticals. Yes, two. Use a T-connector on the back of the tuner. I saw a Webster Bandspanner the other day. It

certainly brought back the memories.

How much did you spend for your transceiver? So it is not a bad idea to spend but a few dollars more to get the proper enjoyment from it.

Away from the restricted space dilemma to those with no such problems. However, it seems that one manufactured 40-metre, 3-element Yagi needs severe changing of the lengths of the elements to obtain the correct operating parameters. Shame! Where is their antenna range... in a subway?

Two-metre operators are saying some nice things about the AEA HR-1 antenna.

If you are using open-wire feed and things just aren't working as well as you feel they should be, add about one-eighth of a wavelength and see if that improves the situation. The same thing holds true for coax.

Another letter writer said we don't mention that wonderful antenna tool, the noise bridge, enough. Considering its great usefulness, in being the only instrument that tells the real truth (if the directions are followed), he is probably correct.

How many amateurs have a dummy load? That's one way to calibrate your SWR bridge. See if it's giving you the real story. The truly concerned would, of course, be using a Bird wattmeter.

Correspondence is invited.

(Cut out this infernal guessing game. KNS and LP are NOT Stu Meyer or Leo Meyerson or Ellen White, nor are they Art and Madeline Greenberg. Just let them leave their silver bullets and ride off.) □

33

Kurt N. Sterba

Well, I see the *Newington News* had another technical glitch in an article. In a special feature aimed at the beginner, the magazine said that a balun matches the antenna to the feedline.

That's all there was. That is called the sin of omission.

Lots of Novices have probably scurried to buy baluns, thinking such an item will automatically match the feedline to the antenna. And why not? That's what the famous publication said.

Let's take a look at reality. First, baluns come with *RATIOS* attached, depending on how they were configured or wound. One common ratio is 4 to 1. That would be the proper thing to use if your antenna was 288 ohms and your feedline was 72 ohms. Then you would have a match!

For example, if you had a folded dipole and wanted to match it to 72-ohm coax, the above 4 to 1 balun would be the proper one. That is, of course, assuming the folded dipole was at the height above ground that would cause it to be that particular impedance. If you had a 200-ohm antenna and 50-ohm coax, the 4 to 1 balun would again do the trick.

The next most common balun to be found is the 1 to 1. That one simply repeats the impedance found at the input to the output. And/or vice versa.

Such may be used to mesh a balanced antenna (dipole, for example) to an unbalanced feedline such as coax. For the purpose of illustration, it could also be used to mesh an unbalanced antenna (vertical) to a balanced feedline (open-wire).

However, in the case above, no *MATCHING* (as in converting impedances) would take place. Baluns can also be wound to be between and beyond the ratios mentioned above.

For the statement to be accurate, one *must* say: A balun matches the antenna to the feedline *if* the ratio of the balun corresponds to the ratio of the impedances of the antenna and the feedline. Should you have, let's say, a 600-ohm antenna and a 50-ohm coax, you would need a balun with a 12 to 1 ratio. Now you have the facts as they are.

Another magazine called the log-periodic a "dream" antenna. Sorry, it's not my dream antenna. We should clear up what may be a real misconception on the part of many hams. All those elements you see up there are *not* active elements. What the L-P is, really, is taking elements that would usually be stacked above each other, and putting them all in a row, on one boom.

The advantage in amateur operation is nil. Where the L-P has its true place is in military or commercial applications, where a wide band of frequencies is used and transmission takes place in what could be called "between the cracks."

The L-P is not some sort of super gain antenna at all. It is merely three elements on each band all up on one big, huge and expensive boom. It has

no magical properties. You might as well stack them and run separate feedlines.

I'll tell you what my "dream" antenna is. Rhombics! Fifteen dB gain over a dipole. An entire S-unit above the biggest Yagi made for the amateur service. You'll have your paratrooper boots on when using something like that.

You're saying, "takes up a lot of real estate." True. And you can't rotate it. True. But in the given direction!! And actually, there is more than just gain. There is angle of radiation. With a rhombic you can get down to 5 degrees. Plus, it will receive much better than a Yagi, multi-element and up high.

A bit less ambitious, with not all that much difference, is the "V" beam. Say, an apex angle of around 40 degrees and 1,000 feet on each leg. Get it up on some 50 ft. pop-up TV masts along the way, put it on 40 meters and you will be king. (Use a tuner and open-wire.)

A thousand feet? What you do is find a friendly farmer. Go out and use it during various contests or whenever you just want to pulverize Europe.

A "V" beam cut for 20 meters will work just fine on 15 and 10. Go out to your special location during a contest. If there is one of those big pests in your area, (every town has one), find where he is in the pile-ups and you'll beat him out every time. What fun! Won't that just frustrate the clod when all the DX stations tell you that you're the loudest signal they've heard all day? Sure, you've got to spend a few bucks, but it will be worth it — every last cent.

If the only area you can get access to is a wooded one, a bow and arrow can get wires way up into trees — the higher the better. The great length will minimize fading as there is a diversity effect. You'll work stations your competitor won't even hear. This could be true joy!

When you do it, send me the results. I'll keep your secret.

Now that we've talked about the ultimate, let's go to the other end — tri-banders. Leaving aside front-to-back figures, let's just look at gain. Using one antenna, a 3-L Yagi on a 13 ft. boom, we see a forward gain on 20 of 7.4dB.

In order to increase but 1dB more, you'd have to go to a 5-L on an 18 ft. boom. That may not be what the textbooks say, but we are looking at the actual results from the manufactured beams. To pick up another whole dB (big deal!), we have to move up to a 7-L on a 25 ft. boom.

Let's look at quads. One manufacturer has a 2-L on an 8 ft. boom with a 8.4dB gain. Another has a 4-L on a 30 ft. boom, and you get a gigantic 1.1dB more on 20. Is the flame worth the candle?

Don't forget, if you have questions about antennas, send them in and you'll receive a personal answer. Some of the queries I've re-

ceived lately have really made me put on my thinking cap.

(Kurt started writing this three years ago, even though his employer has a stern policy against any outside writing. They haven't caught on yet and we're glad.) □

34

Kurt N. Sterba

Never give up, Fight on, fight on. A reader residing in Mississauga, Ontario, lives at a QTH where "no antennas are permitted." In the past 13 months with a barefoot FT-102, he has worked 130 countries (89 confirmed) using only indoor dipoles! That shows what can be done.

Last month we promised you something special and so, true to our word, here it is.

Quite often when a master of ceremonies is presenting a speaker, he uses the phrase, "A man who needs no introduction." Then the MC goes on for 10 minutes or so giving an introduction. So, we'll try to keep ours short.

Walt Maxwell, W2DU, has a B.S. degree and for 20 years was in charge of the RCA Space Center Antenna Laboratory. More than 50 of the Earth-orbiting spacecraft have antennas designed solely by Walt Maxwell. We could go on at great length about his accomplishments, but this is not "Who's Who."

At the Dayton Hamvention, Maxwell handed out a sheet titled "Dispelling Misconceptions Concerning Reflected Power and SWR." In slightly shortened version, here it is:

For the radio amateur, there is probably no topic more fraught with misconceptions than that of feedline mismatch at the antenna. The most serious misconception is that all power reflected at the mismatch is lost, and therefore a 1.1 SWR is essential to prevent a substantial loss

of radiated power. Those who hold this erroneous view are unaware that, except for that lost due to feedline attenuation, all power entering the feedline is eventually absorbed by the antenna and radiated, regardless of the SWR.

They are also unaware that when feedline attenuation is low (as it usually is in typical amateur installations), the amount of power lost in feedline attenuation is so small, even with moderate to high SWR, that the difference in the power radiated compared to that with 1:1 SWR is too small to be discerned by the receiving station.

As will be explained, the only exception to these statements involves rigs having solid-state output connected directly to the feedline.

Thus the question arises: How does the power reflected by the feedline-antenna mismatch ultimately become absorbed by the antenna? With most solid-state rigs it doesn't, unless an antenna tuner is used. With tube rigs, the reflected power is conserved by re-reflection at the source. . . at the input of the final tank circuit; or at the input of the antenna tuner, if one is used; or at the stub, if stubmatching is used. By re-reflection when reaching the source (or the antenna tuner, or stub), the power reflected at the antenna mismatch adds to the source power, which explains why forward power on a mismatched line exceeds the source power by the amount of the reflected power.

If we consider an ideal, lossless line when the enlarged forward power reaches the antenna mismatch, and the reflected power is subtracted from the forward power, the remainder (which is

absorbed in the load) equals the source power exactly. In real life, the line does have attenuation, so in addition to the attenuation of the forward power, the reflected power is also attenuated in the same proportion during its return. The result is an increase in power loss as the reflected power increases.

As an example, assume an 80-meter antenna fed by 100 feet of RG/8-U with a 5:1 SWR. At 4.0 MHz, the line has a matched attenuation of 0.32dB. Follow the SWR=5 line upward to where it intersects the $a=.32$ dB curve. Now go horizontally to the right-hand scale and read .77dB for the total attenuation. Subtracting .32dB, we find the increase in loss caused by the 5:1 SWR to be only 0.45dB — too small to be discerned by the receiving station. If an open-wire line were used instead of RG/8-U, the total loss would be only 0.07dB.

Now for a few words concerning the function of the antenna tuner and the final pi-network tank circuit. Both are matching units that provide a conjugate match for the entire feedline-antenna system. With the tube rigs, the pi-network tank alone can provide the match up to whatever SWR level the same plate-current dip level can be obtained with a 50-ohm dummy load. If a proper plate current dip cannot be obtained, an antenna tuner or external matching network is needed.

In this case, the tube rig is adjusted for optimum output into a 50-ohm dummy load, and the antenna tuner is then adjusted to present 50 ohms of resistance at its input (by tuning for zero reflected power at the input). In the first case, the tube tank circuit alone provides the conjugate match between the input impedance of the feedline and the optimum load resistance desired by the tubes. When the antenna tuner is used, the tuner provides the conjugate match between the input impedance of the feedline and the desired 50-ohm resistive load impedance at the tuner input.

How does the antenna tuner achieve the conjugate match? First, the 50-ohm matching point is at the input terminals of the tuner. Adjusted to provide this 50-ohm input impedance, the tuner-circuit elements produce a cancelling reflection at the matching point which has the same magnitude (*but opposite phase*) as the reflection arriving from the antenna mismatch. The wave action that results from combining these two equal and opposite reflected waves causes total re-reflection of the voltage and current of both reflected waves, and brings them into 0 degrees phase relation with the source voltage and current. Result: total addition of all

reflected power to the source power at the matching point.

Identical action also occurs in the pi-network tank when tuned for proper plate current dip. Here too, the matching point occurs at the input terminals of the network, and identical reflections and wave actions occur in stub matching.

An important point to remember concerning conjugate matching is that once the match is achieved by correct adjustments of the tuner, pi-network or stub, *the entire system is made resonant. . . all reactances in the system are cancelled. . . the net reactance is ZERO!* By conjugate matching, the reactance of an antenna operating off resonance is cancelled at the feedpoint, and the antenna draws current as if it were resonant, because *now it is resonant!*

So when someone tells you an antenna tuner cannot tune your off-resonant antenna to resonance, you can explain to him how it *does!* In addition, by obtaining a conjugate match at the antenna tuner, a conjugate match is inherently obtained at any other junction in the system where a mismatch existed prior to obtaining the match with the tuner (see footnotes 1 and 2).

The complex impedance appearing at any point on the line can be determined by applying Ohm's law to the resultants of voltage and current appearing at that point.

Note that the reactive components of the line-input impedance disappear only when the phase relationship between the resultant voltage and current is 0 or 180 degrees, which occurs at quarter-wavelength intervals along the line.

Although it is not true, some amateurs believe there are two sides to the reflected power "problem," and that the controversy will never be satisfactorily resolved.

Ironically, there is no such controversy among authors of graduate-level engineering textbooks on electromagnetic theory, or among professional specialists working with propagation of fields and waves or lines and in space. Unfortunately, the wrong side is often fueled by erroneous statements published by inadequately informed writers, with the result that a wide range of misconceptions concerning transmission line techniques and antenna theory prevail among many amateurs.

The QST articles listed here were written to identify the fallacious reasoning behind these misconceptions and to clarify them by quoting pertinent facts directly from engineering textbooks. The credibility of the statements in these articles is ensured by numerous bibliographical references to the professional literature on nearly

every topic clouded with confusion. The seven-part series "Another Look At Reflections" alone has 64 references, most of them to engineering texts. It is my hope that these references and my lectures will shed some light on the subject I believe is in need of much enlightenment. And by the way, the *ARRL Antenna Book* is a superb "lighthouse."

1. Everitt, "Communication Engineer," 2nd Ed. McGraw-Hill, pp. 32-139

2) Everitt & Anner, "Communication Engineer," 3rd Ed. McGraw/Hill, pp. 330-339

Did we present Maxwell's paper because it agrees with what we have been preaching for lo, these many months (in the face of much argument)? No. We printed it because it is what a highly qualified and eminent authority knows to be true. To argue against the facts is futile.

(This intrepid triumvirate seeks in the manner of Diogenes. Not even the hallowed journals of New England will be spared the lance, as you will see in the upcoming episode.) □

35

Kurt N. Sterba

A letter to *Worldradio* from a reader said, "Maybe K.N. Sterba could devote more space to aersials and let *QST* alone. I am not interested in whether or not he thinks *QST* is writing correct articles or not."

Well how does that statement go? "Know the truth and the truth shall make you free." Nowhere is there written a doctrine of Connecticut infallibility.

Next, my colleagues and I don't "think" an article is correct or not; we "know!" And, since journalism is supposed to be devoted to accuracy and truth, when an article is neither, we feel obligated to bring such to the attention of our readers so they will not be MISLED by information they read elsewhere.

We have a sense of responsibility to those who read this column. Some are oldtimers, and many are newcomers. Thus, we'd be quite remiss in our duties if we didn't try to protect them from junk information.

For example, there is a book on the market that tells hams to space the director three-eighths of a wavelength in front of the driven element. I'd just hate to think of our readers struggling to put up such a monster. The dimensions for the Yagi are HALF of what the book said.

Three-eighths is .375. The actual dimensions for the spacing range from .15 to .20. Now, some may accuse me of taking a "pot-shot" at a book. I

prefer to look at it as keeping some unsuspecting ham from having a lot more aluminum up in the air than he really needs.

If a book says a Yagi is a phased array, should I say no, it is a parasitic array? If a book says the velocity factor of coax is .08, should I attempt to protect my many readers by pointing out that it is instead (RG/8-U foam) .80? Would it be criminal to let people out there struggle around with 10 times the length of wire while trying to build a stub?

And if a book says the antenna tuner is "fooling" the transmitter and does not make the antenna "work". . . You should hold your nose with one hand and with the other hand drop the book into the trash.

Now, I'm not picking on anybody. I'm not being mean. I'm not arguing because there is no argument! Facts are facts! I'm not being arrogant or anything like that. Not on an ego trip. I don't do this for fame, glory or money (obviously). I'm not nit-picking or taking things out of context.

If I see something that is wrong, I feel it should be pointed out so that the newer hams (and some older ones) are not led astray. I'm doing this on your behalf.

To another subject. The true antenna experimenters may wish to try something different. Make your vertical antenna longer than a quarter-wave! Yep. Make it any length that you want. (Do not go beyond five-eighths wavelength, however.) The longer — beyond quarter-wave —

you make it, the better it will work.

Presently, a ground-mounted quarter-wave vertical has the high current point and maximum radiation right next to the absorbing earth. Not too good. Making the vertical longer (still feeding it at the bottom) will raise the radiation point up the antenna, away from the Earth. Much better.

All you have to do is put a tuner between your transmitter and the line leading to the antenna.

When the people on your net tell you that your signal is stronger, tell them you read the idea here.

(The author goes by the KNS disguise to avoid autograph seekers, arguments with noodinks at club meetings and hams wanting to talk while he's contesting.) □

36

Lil Paddle

Oh, pshaw! *The Newington News* has done it again.

Pray tell, who is minding the store? A recent article by Tug McGraw, in speaking about the dipole antenna said, "It is good for just one amateur band when it is fed with coaxial cable."

Could it be that the entire professional staff was on holiday when that article came in from the frozen lands?

Since I am old enough to be the grandmother of some of the people on the technics staff, possibly they will extend me the courtesy of listening.

A 40-metre antenna will work just fine on 15-metres! It has to do with the law of: odd quarter-wavelengths. (For graduates of the Ricky Crash school, odd numbers are 1, 3, 5, 7, 9, etc.)

In the normal everyday, garden-variety dipole, there is one quarter-wavelength of wire on each side of the centre connector. You will also obtain resonance with three quarter-wavelengths of wire on each leg. Here are some numbers. At 7 MHz, a quarter-wavelength is 33.42 feet. At 21 MHz, a quarter-wavelength is 11.14 feet. Now, multiply the 11.14 times three and you have 33.42. As you see, there are three quarter-wavelengths (15M) on each leg of the 40M dipole.

The information in the paragraph above is no deep dark secret as it has even been written about in technical books issued by the Connecticut chaps.

Let's go another step. A quarter-wavelength at 4 MHz is 58.5 feet. And a quarter-wavelength at 28 MHz is 8.35 feet. Divide 8.35 into 58.5 and the

answer is 7. There you see that there are seven 28 MHz quarter-wavelengths in every 4 MHz quarter-wavelength.

Just as you can operate on 15 with a 40 antenna, you can operate on 10 with a 75 antenna. And, as Walter used to Cronk, "That's the way it is!"

Next month in this space, we'll have some thoughts from the papers of the late Tal Minsik who designed the clandestine transmitting antennas for the OSS.

And, for those who keep insisting that antenna tuners "fool" the transmitter, we present the following words of wisdom from John McAulay, WA6QPL.

It has been my intention to write to you for some time, primarily to offer my congratulations for the excellent and thought-provoking series of articles by you and your colleague. I trust that you will be kind enough to pass this along to him (assuming that you two do correspond).

I finally decided that it (writing to you) would be the definite thing to do after my reading of the July '84 article regarding the "plate fooler" comment and the burning question of whether a match can, indeed, work both ways (ye gods, where do they come from?).

So I sat down at this very machine and prepared a letter which included a two-page dissertation on how one might best respond technically to such folks. Alas, that letter was never mailed, for prior to its completion, the August issue reached my eyes, and I was treated to Mr. Maxwell's paper. Inasmuch as that paper covered essentially all that had been written in my letter to you, you were spared the bother of

redundancy — I simply circular-filed my letter.

However, not all of my points were covered by Maxwell, and I trust you will be willing to read mine which remain. First of all, even for old-timers, antenna tuning has been antenna tuning for quite a while. I refer to Henney's *The Radio Engineering Handbook*, Third Edition, McGraw-Hill, 1941, in which the late Ed Laport defines *antenna tuning* as "The act of resonating an antenna system to some frequency other than a natural frequency by means of reactive devices." (Found on page 629. . . this information might well appear the same in the 1933 First Edition of the book, but that edition is not in my library.) Laport then, interestingly, defines *antenna loading* as "Lumped reactances connected in the antenna system for the purpose of antenna tuning."

By the way, it is my personal preference to view the "antenna system" as everything between the final source of RF power in the transmitter and the natural medium (usually free space) to which the antenna is coupling that power. In my view, therefore, the antenna system includes the Pinet* in the transmitter housing — a concept which I was gratified to see is evidently shared by Mr. Maxwell. My definition, of course, applies to a transmitting antenna system and needs minor modification when applied to a receiving antenna system.

While it warmed my heart to see Maxwell's statement that when properly coupled, the entire antenna system is made resonant, a concept which seems to be little appreciated among amateur operators, I do take mild exception to the line: "By conjugate matching, the reactance of an antenna operating off resonance is cancelled at the feedpoint, and the antenna draws current as if it were resonant, because *now it is resonant!*"

While this is certainly — or at the least, perhaps — a workable way of phrasing things, I would prefer to note that conjugate impedance matching is just that — *impedance* matching, not just washing out the antenna's reactance. I also make the teeny-weeny point that in so doing, we have not really made the antenna itself resonant, but we have rather — as Maxwell accurately stated in the previous sentence — resonated the *system*.

We also have, of course, through conjugate impedance matching, provided an environment in which the antenna *resistance* is matched to the transmitter's final active device's plate, collector, drain (or whatever) resistance. Optimum power transfer strikes again.

I don't mean to be "picky-picky," but I'm afraid that a lot of my misconceptions early on (and, no doubt, some which remain) were enhanced by the occasional "simplified" explanation. . . but anyway, by golly, if that's all that could be argued about in Maxwell's paper, then it surely has to be rated superior.

Speaking of resonance, I gather from the August column that you folks may soon attack more of the alleged authorities who turn out to be, on close (or even not-so-close) inspection, to be truly of the "let's be sure to get the lightning rods charged" school of skyhookery. I truly hope that one of your attackees might be the author of a not-too-long-ago *QST* article, a supposedly learned professional who concluded that a certain antenna type couldn't really work well because it was not resonant.

I suppose I deserve a scathing reprimand for not having written a scathing rebuttal to this insanely preposterous conclusion, but somehow I would rather personally address those authors with whom I agree. Maybe that's why I write so few letters to authors. (By the way, I spent a number of years in broadcast consulting — I occasionally resort to the wild exaggeration, "I've built more radio stations than you've ever heard!" when intimidation seems in order — and I do believe that most amateurs would be mystified to learn that resonant AM broadcast antennas are almost as scarce as Russian athletes at the '84 Olympics.)

Well, that's about it. As you might gather, I'm a real antenna nut, and it pleases me to report that your articles frequently leave me laughing. I hope you do understand that the two really do go together.

I certainly respect your anonymity, as I know how frustrating it can be to try explaining something face-to-face only to hear, "oh, no, that's not right!" It must be pleasant, though, to be able to do it all in writing.

My best to you, Kurt. I look forward to my enjoyment of "AERIALS" for a long time to come.

Regards,
JOHN A. MCAULAY, WA6QPL

* — Or whatever else (tank, half-wave filter, etc.)

(Some criticise the aerial columnists for writing under aliases. Their reply is, "Tis better to write the truth under a disguise than (as others do) write hooey under their real names.)

37

Lil Paddle

The trap was set, and people walked right into it.

First of all, young whippersnappers should not argue with those who date back to the era of Meissner.

It all started with my statement that an 80-metre antenna would work on 10 metres. We know it works because we've done it. Theoretical arguments against it are in the same league as those who say the bumblebee can't fly.

One letter stated that such an antenna would have a feedpoint resistance of 140 ohms. All I can say is, "SO WHAT?" There would be, yes, an SWR of 2:1. And that condition gets another great big "SO WHAT" and "WHO CARES?"

While it is true that many feel that an SWR of 2:1 will allow the republic to fall, let's look at reality.

Assuming a 100 ft. run of RG-8/U foam is being used at 14 MHz, here's what really happens at 2:1. There is a loss of .15dB. Yes, that's right — .15 of a dB.

On some SWR bridges at 3:1, the panel is painted the color red. Condition Red results in a loss of .35dB. Yep, one-third of a dB.

Do you know just how meaningless a third of a dB is? Just how meaningless is it, Johnny?

Well, an S-unit is 6 (six) dB, so a loss of .35dB translates into .06 of an S-unit. Or put another way, 1/17 of an S-unit. Instead of being "S-9," your report will only be "S-8.94."

DXers who are accustomed to receiving reports of "20 over" will be crushed when they hear they are only "19.65 over." Why, they'll probably give it all up and take up stamp collecting.

How 'bout an SWR of 5:1, you may ask. Does the Earth stop spinning on its axis? Actually, the loss now is .8 of a dB.

And what is 1 (one) dB? If you were listening on a pair of earphones to a single tone, and you were told to raise your hand when you detected the slightest increase in volume, you would do so at an increase of 1dB. Right, it is the barest

perceptible change in level — and that is on a single, continuous tone.

In order to throw away that 1dB, you must have an SWR of 6:1. Such a condition (neglecting, for a moment, normal line loss) would be a 50-ohm transmitter, a 50-ohm feedline and a 300-ohm antenna.

As you can see, when they speak of an antenna's bandwidth being the range between the 2:1 SWR points, it's pretty ridiculous.

To make the point by extremes, we are now going to throw away 1/2 (one-half) of an S-unit. This is the three (3) dB point, or half your power.

That requires an SWR of 20:1. The condition is: 50-ohm transmitter, 50-ohm line, 1,000 (one-thousand) ohm antenna. Your signal has dropped from S-9 all the way down to S-8½.

Incidentally, under the same conditions, using instead open-wire line, the line losses are so slight they are not worth even thinking about.

To another subject: The *Worldradio* offices have received letters saying we are bitter and antagonistic toward the ARRL (for pointing out mistakes in their antenna articles). Nothing could be farther from the truth. I'm a Life Member and have held leadership posts in the League. The greatest supporters of this column (saying we are right) are the two-letter calls.

We are not picking on the ARRL. We point out gross errors to protect newcomers (and some old-timers who have lost their way).

For example: Just out is a new book called *The Dandy Dipole*, published by Unadilla at a price of \$3.95. It is written by two authors, one of whom has no call after his name.

On page 5, in speaking of antenna height, the reader is told, "The ideal is computed as 0.25 wavelength." Page 14 says, "If we can't get it up that high, 0.125 wavelength will do."

In reading over my original draft of this column, Kurt said, "Putting a 20-metre antenna up 17 feet will get your butt kicked so hard your nose will bleed."

(The trouble with crass people is they don't know they are and that other people are not.)

Just what happens to the poor Novice who reads that "0.125 will do"? He puts up his 15-metre dipole at 6 feet above ground! His only chance to make contacts is to buy one of those Doctor DX simulators!

Pity the poor Novice who reads that book and puts up his 10-metre dipole at 4 feet. He won't even work his neighbour's TV set.

Page 4 tells us, "The height does not seem critical from a radiation pattern point of view." That's about as wrong as it can get. We point that out only to aid those whose aspirations are beyond the Worked All States award.

Also on page 4 is a chart telling people that the "ideal" heights for antennas are (20) 16.50, (15) 11.00 and (10) 8.16 feet. And get this: the "practical" height is (20) 8.25 (15) 5.50 and (10) 4.08 ft.

Ladies and gentlemen, if you follow those instructions you won't even get WAC (not Worked All Continents, but Worked All Counties in your own state!).

The only virtue for a Novice putting a 15-metre antenna up 6 feet is that he certainly won't be spending much money on QSL cards, postage or IRC's.

Will we get some letters accusing us of "picking

on" this book? Probably. Better you should write to the company distributing it and ask them why they are foisting off such trash on the unsuspecting neophytes. People following such absurd instructions will soon give up their licenses.

We've been criticised for not being "constructive" and "knocking" others. Well, the most constructive thing we can do is keep people out of the quicksand. Such a book (and others) deserves to be knocked!

Do not write to us or *Worldradio* and complain about this column. Better you should spend your time getting someone who knows something about antennas to come and lecture at your club, or buy a decent antenna book.

Anyone writing to disagree with the earlier part of this column about SWR and loss will do nothing but embarrass themselves. An old lady I may be, but sweet I'm not.

(Lil and Kurt, Mr. and Mrs. in real life, go by their code names so as to, like the Ninja, pass through with the cloak of invisibility. Amateurs who fight with them about antennas go to the battle unarmed.) □

38

Kurt N. Sterba

Five contacts in five minutes, done while using very little, from 1952 to 1957Z on the Sunday of Sweepstakes. The rig measured 70 watts output on the Palomar light-bar wattmeter, and the antenna was my little favorite, the "Spider" from Multi-Band Antennas, used on 15 meters.

We're talking about a mobile mast 4 feet 2 inches long and an element which is 1 foot 3 inches long sticking out sideways at the top of the mast. The whole thing was placed on top of a card table in my backyard.

The 20-meter element is 22 inches long; the 40-meter element is 20 inches long and was responsible for five ARRL sections.

Multi-Band Antennas just came out with a 75-meter element. I used it with *no* radials for that band. All I had were two radials cut for 40 meters. The mast and element on 75 is an inch short of 6 feet long. That's about one-eighth of what it should be for one-quarter-wave performance. On 75 meters, I worked 500 miles in one direction and 600 miles in another direction.

What did I accomplish with near the bottom of the heap as far as power goes, and what must have been the smallest antenna in use during Sweepstakes?

All call areas, all ARRL Divisions, every section in four of the call areas. Geographically it was from Hawaii to New Hampshire, British Columbia to West Indies, South Texas to

Saskatchewan and a TI. What didn't I work? VE8, KL7, Wyoming and a few others. Made just about 150 contacts. Since I won contests 25 years ago, don't feel I have to prove anything anymore. Now I leave the shack, and go relax with a good book and a good cigar.

Sure, there were times I got really beat out when calling a station. But there were times I'd make four contacts in six minutes, two in two, two in three, three in four, over and over again. Even got a report of "beautiful signal;" it was a great path, and the other station was super loud.

This was all done in *non*- "hot-dog" fashion, just moving up and down the band, answering CQs. At my age I go into contests in a very non-stress manner. All I really wanted to do was check out the new 75-meter element for the Spider. Obviously it does what it is expected to do. And I like to show the geographical expanse that can be worked with a mobile antenna and relatively low power.

Speaking of accomplishing a lot with not much, we now turn to a recent communication from Maria Evans, KT5Y:

How about devoting some time in your column to my absolutely most positively favorite all-band antenna, the center-fed Zepp? As manager of the Missouri SSB Net, I am constantly crusading on the virtues of this antenna in the hopes that my weaker stations will be heard through the cacophony of 75 meters.

Of course, you know the most common excuse for "why I don't get on 75 meters" is, "I don't have room for a 75-meter antenna." Even a small Zepp has a longer effective antenna length than a garden-variety dipole, and is easily resonated with a tuner (notice I'm an enlightened person and say that it's *resonated*, not plate-fooled). Guess that makes my pi-net a final-fooler too, by that line of defective reasoning!

My favorite antenna book is my 1947 *ARRL Handbook*, which seems to be more technically correct than the antenna section of my 1983 *ARRL Handbook*. Of course, coax wasn't the vogue in '47, so the Handbook contains pages of really neat-o antennas with open-wire feeder systems. Back then, they even *admitted* that coupling networks actually *resonated* the antenna!

Anyway, I need you all to back me up. I'm tired

of net members with crummy little trap dipoles calling me a liar. I'm sick of new hams laughing at my 37-year-old book. (It's 13 years older than me!) Just once I'd like someone on 75 to believe I'm not running a linear. All I did was follow the cardinal rules about Zepps: 1) don't make the feeder a quarter-wavelength of any band; 2) make it as long as you can; and 3) try to keep it as flat-topped as possible.

The trap dipole guys say, "No way — sounds too much like magic to me;" "Yeah, but you gotta use a tuner;" (So what? Is a "natural" 1.5:1 better than an "artificially induced" 1:1?); "Aw, I bet it's TVI city in your neighborhood;" (Get lost! Nice even, balanced, matched impedance and a *low-loss* feedline lessen your chances of spurious radiation.) And "yeah, but your antenna's not *really* resonant, and my trap dipole is!" (Urp. Barf.)

So *PLEASE!* Help me out and set 'em straight. I'm counting on you!

Thanks, Maria. Well, you certainly don't need me to straighten anyone out. You've done a great job yourself. Oh, the irony of it all. . . a 24-year-old YL has it all figured out and the OF's are arguing with her. I just love it! (Hey, that sounds like some kind of sexist stereotypical remark to me. Watch it, Buster! — Lil)

Not really. You know, the JAs are going to come out with computers that don't need any programming at all. You just type into it what you want it to do, and it goes on from there. Then they will have computers you just talk to and tell it what you want it to do. They will win. Deservedly so. We have a lot of Americans who still haven't even figured out how the antenna works.

A note to those who wrote in about Lil's column about SWR last month, saying that when the SWR went up their transmitter either reduced power or cut off altogether and so her remarks were not practical. Gents, what you do is use a *tuner!* A *tuner*, just like we've been saying all along.

(*The WR antenna gang, wishing to avoid the fate of Galileo, go by their Mark Twains in order to avoid — at flea markets, hamfests, conventions and on the air — those whose brains are QRP and QRS.*) □

Kurt N. Sterba

There is in this world poor information, bad information and dis-information.

An example of the latter was in the January issue of *Ham Radio* magazine. It said, "The 5/8-wave antenna . . . has become a broadcast industry standard antenna."

Not true. the overwhelming majority of BC antennas are quarter-wave or shorter. No more than 1 percent of the radio stations have 5/8-wave antennas. Here's why, and the proof.

A station at 600 kHz would have to erect a vertical stick about 975 feet high. At 1500 kHz it would be 390 feet tall. Have you ever seen a 1,000-foot AM tower? Not even the wealthiest of Top-40 stations can afford the megabucks such a monster costs. The little putt-putt stations at the high end of the band can't afford it either.

Then the December issue of *CQ* had a real gem (there must have been a full moon or something when these articles were written). We quote, "I don't know of any home-made dipole that will cover the entire band with a low enough SWR for modern equipment.

Well, first off, a good tuner will do the job just fine. OK, what if you don't have tuner? It's really simple! Build a two-wire or three-wire dipole, depending on how much of a purist you are.

For example, you could use everyday zip cord, cut one of the two wires to the high end of the band, and cut the other to the low end of the band. The longer wire will work just fine on the low end, and the shorter one will put you in the high end. A purist will have a third wire for the middle of the band.

You could even use multi-wire rotor cable and cut each of the wires to a different small slice of the band.

With such, when you run your SWR sweep across the band you will see a very smooth flat curve. The power is being accepted by the particular wire cut closest to the frequency you are on, and being thrust out into the ether.

Then, in the most recent *Handbook*, there was much space devoted to the Wullenweber antenna.

Hilarious! The number of hams who will build such a thing is a big zero.

What might be a bit more relevant for the individual who is dependent on the *Handbook* for their technical information would be the Windom, which is no longer mentioned.

The great virtue of this antenna is: should you be without coax, open wire, 300-ohm line or even twisted pair and are down to your last few scraps of wire, you can still get on the air.

In this bare-bones situation, should the physical set-up at your QTH keep you from wanting to do the end-fed bit (a very high impedance, tough to match), the Windom will be ideal for you.

A very simple tuner, one capacitor and a coil will match it, and it is fed with only *one* wire. The antenna is a half-wavelength at the lowest frequency. An 80-meter Windom will work on 80, 40, 20 and 10. One cut for 40 will work on 40, 20, 10, etc.

The antenna is one solid, unbroken wire. Find the exact center. Then starting from the center, you will have quarter-wave on one side and quarter-wave on the other side. You will attach the one-wire feedline at .3 of the distance from the center to the end. It's not as complicated as it sounds; here's an example: Antenna for 3800 kHz. Antenna is 123.15 ft. long. Center is at 61.57 ft. Measure 17.5 ft. from center and solder wire. That's your feedline. Bring it away as straight, 90 degrees from the antenna for as long as possible. With this antenna, it is important to have as good a ground system as possible.

Here are some other dimensions to give an assist: At 3.500 MHz, 19 ft. from center; 3.6, 18.5; 3.7, 18; 3.9, 17; 4.0, 16.5. (Total length is 133 ft. 8-1/2 inches.)

On 40 meters at 7.000, the tap would be 9 ft. 6-3/4 in. from center and at 7.300 it would be 9 ft. 2 in. from center. (Total length is 66 ft. 10-1/4 inches.) At 14.000, 4 ft. 8-7/8 in. and at 14.350 it would be 4 ft. 7-5/8 inch. (Total length is 33 ft. 5-1/8 inches.)

Let's look at an application for this antenna. Extreme case: *NO* antennas allowed! Run the antenna wire along your fence, placing it so the one thin, inconspicuous wire goes into the shack window.

On 40 and 80 you may be surprised how well a low-level antenna works for close-in contacts.

This is what is called a harmonically related antenna. To avoid radiation on the second harmonic, you may wish to experiment with the tuner settings while a friend of yours listens one band up at the exact double of the frequency you are on. That is why the ham bands are where they are, so that we foul only our own nests. (There is a 40-meter Novice in my neighborhood who puts a whopping signal into the 20-meter band.)

A long time ago, instead of there being a 50 MHz band, it was (5 meters) 56 MHz, and instead of the 2-meter band being where it is now, it was at 112 MHz. See the progression? 3.5, 7, 14, 28, 56, 112. (Ooops, forgot 160 meters, half of 3.5.)

Rigs were crystal-controlled in those days, and multiplier stages would be built to double or triple the frequency of the preceding stage. And with one antenna you could work all the bands up. The antenna would radiate as a half-wave, full-wave, two-wave, four-wave, etc. And, if the feeders were long enough, it would radiate well enough on a frequency lower than the flat-top was cut for. This was all with the aid of a tuner, of course.

If the ancient Windom is what you need, and it works for you, forget what any scoffers say. I can tell you that Windoms have worked lots of DX.

Then we come to remarks in the February 1985 issue of 73. While they were outside of my usual environ of antennas, I am forced to comment. I quote, "Except for a few backwaters of communications, Morse has been dead for years. Even the Boy Scouts have dumped the code." Etc., and so on.

First, I don't find the Boy Scouts' example any more the path to follow than the fact that the high schools have dumped learning.

An analogy: A very high-ranking U.S. government official was flying to Europe. He and his staff were the only passengers. There was a massive electrical failure and all the whiz-bang navigation aids went dead. The navigator didn't know one star from another! There was now a lot of sweat. To make a long story short, because of the gravity of that one situation, navigator school went back to the teaching, and use, of the sextant.

The moral of that true story is, if it ever got to

the down and dirty, vital communications might have to be passed on a DX-60 and an S-40B.

So what if the Boy Scouts gave up CW? The *big* boy scouts (Special Forces) have not! The schools also gave up compulsory physical education, and we've got a bunch of fat kids now.

The most secret of government agencies (so secret the other ones don't know they exist) still operate CW. Why?

Here's why: "Development and use of other high-speed communication equipment has not decreased the need for radiotelegraph operators who can copy through natural and man-made interference. There is conclusive evidence of situations where sustained CW operation provided the only useable method of communicating."

OK, I've gone on at length about what I don't like. And since I'm fully aware of the phrase — "No statue has ever been erected in honor of a critic," what is it that I do like?

Well, I very much like the Palomar light-bar SWR meter, and we'll talk about that next month.

I like the MFJ dummy load.

I like Butternut antennas. They work so well you'd think the Butternut Company had a giant computer and everyone who has bought one is entered in it. During contests the Butternut Company sends people with great receivers all over the world, each with a computer printout, and they work you if you are on the list.

I think someone knows who we are, because on Christmas morning, when I went out to get the newspaper, sitting in front of the door was... a really ancient Heathkit Antenna Impedance Meter, Model AM-1 (in the original box). It is so old that not-only are there no zip codes, there aren't even the old postal codes. Gee, it really made me feel good.

To my unknown friend, Thanks. But please keep the secret.

(K.N.S. goes by his nom de guerre so as to travel his path of pointing out clay feet, Trojan horses, and goombah without having to face those who would be furious or, on the other hand, attempt to curry favor.) □

Lil Paddle

For some years now, this column has been extolling the virtues of 1) the Butternut vertical antenna and 2) the horizontal loop antenna.

In the latest issue of one the hammags, they made much of both in the same issue. . . finally. We yawn.

We've certainly come a long way in apparatus which displays that RF is indeed going in the same direction we wish. People have used bulbs, large and small, with the amount of light indicating radiated power. The reckless among us even used lead pencils in close proximity at the final tank coil and judged power by the arc that was drawn.

Then came the SWR bridge and its SET control and switch to look for REVERSE. Then came the devices with two needles so one could see what was happening simultaneously in both modes without having to throw a switch.

Now let's look at the light-bar SWR and power meter from Palomar, that very fine company which introduced the first really useful noise bridge to the amateur.

On the power side of things, there are 10 light bars with a switch that selects scales of 2,000, 200 or 20. Printed next to the light bars are the numbers 200, 150, 125, 100, 70, 50, 30, 20, 10, 2, 0.

Depending on the position of the switch, the light bar would be reading either 500, 50 or 5 watts. My little transceiver lights up the bar at the 70 level.

On the SWR side there are also 10 light bars. The printing on the panel is 10, 3, 1.5, 1.2, 1.1, 1.0.

Preliminary tuning-up can be done at a power level so low that the first light in the lowest power range doesn't even light, but you will see the SWR bar light up. Coming up from the bottom of the band there was no SWR light until I hit 14.050. Then I put the tuner into the circuit and tuned it out.

Various antennas were tried out, and I had a feeling of satisfaction to see the SWR lights drop down to where none lit.

It should be pointed out that you will not, as with an analog meter, read 62.5 watts. The virtue of this meter is you are able to see both actions at once.

Yes, you seem to have a different grasp of the situation than with the needle meters. It did seem that tuning up went faster than before.

Also, there is an ego trip when using voice and the power peaks are lighting up and the SWR side shows not a glimmer.

One thing this unit has going for it is that it is manufactured by Palomar! As a functional tool and a pleasant addition to the shack, we say it's highly recommended.

Another subject: With some better weather coming, people will be working on antennas again. Unfortunately, this will mean (ugh) tuner-uppers. The enlightened among us will have written on 3" X 5" cards the settings for various frequencies. The not-so-erudite will continue to twist every knob in sight as they move 10 kHz.

So, to minimize the birdies and irritated people when their QSOs are ruined, let us do all our antenna experiments on one frequency and at certain times, such as on 40 metres, GMT times, 0000-0400, 7215; 0400-0800, 7260; 1600-1800, 7175; 2300-0000, 7165. So, if you must, that is where and when to do it. (You clever people who figure out the why of those times and frequencies will get a prize.)

(The ersatz monikers used by the writers are so the people they [with good reason] praise won't try to buy them a drink at Dayton, and so they don't get in fights with people whose bulloney they expose [like next month]. But they do have their self-defense plan should anyone get violent — Kurt grabs them by the nose while Lil kicks them in the pants.) □

Kurt N. Sterba

Tough guys don't cry, but the tears are running down my cheeks. Why do people write such mish-mash?

I'd missed the article, but one of our sharp-eyed readers brought to my attention that *The Newington News* has done it again!

In an article written by one of its well-known staffers is found this absolute gem, "Most of the popular gain antennas are also directional." Are they doing this just to give an old man spasms?

Now I've received letters saying that I shouldn't criticize other magazines. Well, I look at it this way — someone has to protect the E-1s and E-2s of Amateur Radio! What *would* have been spectacular would have been an article about the gain antennas that are not directional.

I guess it's up to ol' Kurt to straighten things out (again). Gain, as measured in dB, is a ratio expressing more power in a given direction than does something that is used for a reference.

One term is dBi which means gain over an isotropic antenna. Such is a totally imaginary device that radiates the same in all directions. One way to visualize such would be a pencil point right in the middle of a tennis ball. Radiation goes out from the point in all directions at equal strength. No such antenna exists.

Then there is dBd; that's gain over a dipole. Theoretically, a dipole radiates broadside to the antenna. If the antenna is running north and south, most of the power is going east and west.

Should you place another element near the dipole, about one-eighth of a wavelength away, and about 5% longer, you'll have a 2-element Yagi, with the other element acting as a reflector. The reflector does exactly what its name says — it reflects.

Less power is going in the direction of the reflector and more is going in the other direction. Now, the only reason we have gain in one direction is because we have robbed it from the other direction.

A 3-element Yagi (adding a director) has even more gain than a 2-element Yagi, and that's

because even less is going to other directions. Yagis and quads are called "beam" antennas because they beam the energy in a particular direction.

There are some scientific ways of expressing not being able to create energy and all that, but the best way to describe it is, "There ain't no free lunch."

You just can't get more power in some direction without taking it from somewhere else, such as the back or the sides.

VHF gain antennas such as stacked verticals are taking it from the lobes that previously were going up. But the article was not addressing such because the next part of the sentence was, "and are erected so they can be rotated."

Should you have a vertical antenna on a tower, there is no need for a rotator!

Then, in 'Hints and Kinks,' someone was talking about a loaded vertical and a transmatch with this statement, "Although a transmatch allowed me to feed the antenna over the entire 80-meter band with a low SWR at the transmitter end, I felt that the antenna was performing poorly when I was operating about 30 kHz from the resonant frequency."

To put this in perspective, I'll make an extreme statement. There's no such thing as a "resonant" frequency being some sort of magical ideal. Some given length of wire or aluminum doesn't "hum" any better when one particular frequency hits it.

Resonance means the frequency at which there is no reactance when related to the feedline, and where and how you are feeding it. If the antenna is a little long (inductive) or a little short (capacitive) and your tuner compensates for it, everything is just fine — really!

Extreme example: You have a 40-meter dipole fed with open wire and a tuner. Now you pump 80-meter energy into it. You have a half-size antenna. Assuming the tuner will cover the range and essentially lossless line, you will have about 3dB less radiation (1/2 S-unit) than a full-size antenna for the frequency.

So, if whacking the thing in half drops only 3dB, what tiny sliver do you think is lost when

you are 1% off frequency, or even 10% off frequency?

To really know what is truly happening, put a field strength meter out somewhere and look at it from the shack with your field glasses. Go up and down the band, twist knobs, and see what happens.

There are a lot of beliefs, cherished assumptions and all that, but please know that field strength is truly the "bottom line." Again, what counts is not theory (supposed), but the level of radiation. If you measure what is happening, you are plugged into reality.

But then, SHAZAM! Page 45 and 46 of the March 1985 *QST* come to the rescue. Certain to send a good number of hamateurs into apoplexy, the antenna guru Walt Maxwell, W2DU, says such things as, "When conjugate match is accomplished at any of the junctions in a system, all reactances in the system are cancelled, including any reactance in the load." Some folks should cut out the page, laminate it, keep it at the operating position, and read it every day so there won't be so much bulloney heard on the air.

Maxwell goes on to say, "The logical place for a transmatch is on the operating desk, not at the antenna.

You can argue with ol' Kurt all you want, but the only people who argue with Maxwell (the defender of the truth) are know-nothing nood-nicks.

Then on the same page, John Belrose, VE2CV,

phrases it, "An ATU tunes the antenna and transmission line and 'matches' the radiating system to the transmitter."

Considering the myth-busting value of just the first paragraph of the Maxwell article, that page alone is worth the whole price of the magazine, a year's subscription or even a Life Membership!

The April 1985 *CQ Special Antenna Issue* has some good articles, particularly page 32 and the article about the Palomar impedance matching baluns. Oh, how I'd like to see a three-wire up in the air, the sun reflecting from copper wire. . . that's *real* radio.

Very good issue except for the mention of the coaxial double bazooka antenna, an expensive way of accomplishing nothing more than what any plain old wire will do.

The laugh of the month came from a contester telling how he just couldn't get out on 20 meters. It was a real fight just to make a few contacts. Later he found that he had his 40-meter antenna connected instead of his 20-meter beam, and that was at the very beginning of the contest, not at the bleary-eyed, fuzzied brain condition that comes after many hours. (I thought every contester kept his SWR bridge on reverse just as visual guard against such a possibility.)

I'll end with this: If it matches, it's good for you.

(KNS pens covertly to avoid confrontation with those who put up antennas with directivity but no gain.) □

42

Lil Paddle

Good Grief! Again a magazine for radio amateurs is spewing forth utter nonsense. I refer to the May 1985 issue of *23 Skidoo* in which was found this bilge:

"An antenna tuner, or transmatch, is a device used to couple a transmission line to a transmitter, providing an artificial match between the antenna and the transmitter when the SWR would otherwise be too high for proper operation.

"It does not actually correct the antenna mismatch, but 'tricks' the transmitter into thinking the antenna is matched and therefore lowers the SWR at the transmitter to an acceptable level."

The above two paragraphs are absolute rubbish!

It is indeed quite startling that such rot is perpetuated in hammyteur circles. For you see, never will you read in the professional literature such terms as "trick" or "fool."

Who are the professionals? There are trans-

mitting stations running 10 times the transmitting power of amateur stations. There are transmitting stations running 100 times the transmitting power of amateur stations. There are transmitting stations running 1,000 times the transmitting power of amateur stations. You may rest assured that those engineers are “doing it right.”

And the books they are reading do NOT have “trickee” or “foolee” in them. A term that is used is “line flattener.”

Now, let's take the very term transmatch. It has trans in it, as does the word transformer. Not even the most obtuse ninny is out about saying that the pole pig (dropping transformer) fools the house. Everyone seems to accept the actuality of it all when they hook up their 8-ohm speakers to their high fidelity system knowing full well that on the other side of the transformer the valves have plate impedances of from 5,000 ohms to 50,000 ohms.

Only when it comes to antennas is such trash bandied about. In reality the antenna tuner does exactly this: it transforms the resistance and cancels out the reactance. Yes!

Have you even seen a ship's radio installation, where lives are at stake? They use antenna tuners.

If the bulletins of the radio clubs wanted to perform a great (and obviously needed) public service they could issue a warning that much printed about antenna tuners is dangerous to your understanding of reality.

The same issue of the magazine that wrote the bunk about tuners then did the same regarding the coax lines between verticals in a phased array. It said that in order to find a half

wavelength at the chosen operating frequency you should use 468 times the velocity factor of the coax and divide that by the frequency in MHz. WRONG!

The 468 figure is for a half-wave antenna. One should start with 492 times the velocity factor.

Another canard floating around is that the only place to take an SWR reading is at the antenna. WRONG again.

Put your meter at the end of the coax because you should be measuring the effect of the coax also. The antenna AND the coax make up the system. Make the adjustments (gamma match, whatever) so it all works together to present the best match at the transmitter output.

Now a note to the person who came up to the **Worldradio** booth at the Dayton Hamvention and told the staff that I was wrong about tuners in the aspect that while it did have the effect I said on transmit, it did not accomplish anything on receive.

I feel sorry for the clients you have in your engineering business. Have you not heard of the Law of Reciprocity?

This column is intentionally done in a lighter vein, sugar-coated manner so as to be easily understood by the newcomer. Should any arguments about our work be foisted off on other parties repeated, we'll drop so much real engineerese in this space that you will feel as foolish as you should.

(The pundits of the Aerials column go by their disguises so as to avoid on-air diatribes from those whose technical proficiency stopped with the crystal set.) □

43

Kurt N. Sterba

So, what if you don't have an antenna? Use something else! What if you don't want to incur the neighbors' wrath? Use something else.

Use a ladder, for example. I did and it worked. A plain old garden variety eight-foot aluminum

ladder, set up in the back yard was my radiator in the Radiosport contest.

With a C-clamp pressing one of the thick wires of the Budwig connector to the side of the ladder. I fed it with coaxial cable. On the ground side of the Budwig connector I laid out four radials.

As you know, with a solid state rig the ammeter

serves as sort of an SWR bridge. With SWR the power backs down in ratio with the amount of SWR. On every band I was able, with a tuner, to get full bore 16 amps forward power.

The tuner settings were (75) 5E5, (40) 8C5, (20) 4B2, (15) 0B6, (10) 10A0.

How did it work? With propagation that was nothing to write home about I got all U.S. call districts, Canada, Mexico and a DX.

True, I was working the big signal stations such as KB1H, N2IC, K3ZO, N4UM, KS5M, W6UE, KA7KDU, NJ8L, NB9C, KF0H and the like. But I was not getting killed in the pileups either. Obviously with 70 watts output into a ladder I was not going to command a frequency with everybody flocking to work me. I would have to move up and down the band answering the CQs. At a non-frantic pace I was able to get 3 contacts in 6 minutes, 4 in 7, 4 in 4, 3 in 6, 3 in 5, 2 in 2, etc.

True, nothing to set the contest world on fire but little runs of one a minute with no power and no antenna is sort of a moral victory. (Later with my horizontal loop on 40 I made 14 contacts in 10 minutes. Had to stop and rest. Those who say contesting is a young man's game are right!)

Why did I load up a ladder? To prove a point. If it accepts power, it works, No matter what the circumstances you can do something to radiate. Even if you are in a neighborhood that totally forbids antennas you could throw a little mobile antenna in the back yard and get in on the contests and have some fun. Should someone be prying on what you do so closely that you could not even get away with that then I have news for you. You don't live in the US of A, you're living in Bulgaria!

When a ladder (for goodness sake) will span the continent and a bit of north and south thrown in for good measure, you could go into Sweepstakes and have a ball with practically anything! So as not to be misleading I'll admit there were stations that never heard me at all. But that can happen to you running big stuff, too.

Who knows what the "resonant" frequency of a ladder is? With the rungs shorting across, what actual conditions existed? Probably just one big mess. But that was why I did it. Yes, a big blob of metal, not cut to any specific length, and during pretty crummy conditions, can fling a signal a couple of thousand miles.

Actually it was more fun to hear a station call, give him one call back and have him answer right off, knowing that my antenna was a ladder than later in the contest with the big Yagi and the amplifier.

What's next? Will we load up a station wagon on 80, a mid-size car on 40 and a compact car on 20?

Write in and tell what you have done along these lines. Have you ever just snaked 64 feet of wire along the fence and through the rose bushes? How did it work out? Others would be interested.

Should there be any scoffers reading this, let me point out that clandestine radio operators, running very low power, were not exactly putting up 100 ft. towers saying "Here I am everybody!"

They really hid their antennas, and they were heard at great distances and across oceans.

I was looking in the July 1985 issue of one of the hammy magazines and there were instructions on building a Cubical Quad. It showed the center conductor going to one wire and the shield to the other wire. The direction read, "Waterproof this joint." Nothing about how to do it. What does a newcomer think when it just tells him waterproof that joint? Does he wrap a dollar's worth of tape around it? Does he go to one of the road crews and get some tar?

I think that all antenna construction articles should say "Get a Budwig connector." Now, I don't know this Budwig guy, wouldn't know him if I saw him, but he does make one fine product. I've used them for many, many years now. Bought another a couple of months ago for \$5.95. They don't break; it's just that I misplace them. If there is anything on this earth that you get your money's worth for, it is those Budwig connectors. There's even a little hole in it so you can tie it up in an inverted V configuration. This should be used on any antenna that is coax fed. It just makes me cringe when I see antenna articles and books showing broken bottles and bits of plastic or whatever as the means of bringing the antenna and the feedline together.

(KNS goes by his moniker to avoid irate comments at radio club meetings from people who make less contacts in a contest with a real antenna than he does with no antenna.) □

Kurt N. Sterba

It's time for a review of antenna topics. See which ones you agree with and which you disagree with.

1) On 40-meters, using a 7-foot-tall helically wound vertical, we could say that performance from this type antenna is comparable to that of many full-size quarter-wavelength vertical antennas.

2) Reducing the size of an antenna by 50% does lower the efficiency by a decibel or two.

3) Differences of less than 2dB however, are still hard to discern.

4) A 6-foot vertical on 40 meters can produce an exceptional signal.

5) Short verticals such as these (above) have the ability to radiate and receive almost as well as a full-size quarter-wave antenna. The differences are practically negligible.

6) An amateur in Detroit once used his Shopsmith craft machine (about 5 feet tall) as a 10-meter antenna. He worked a number of DX stations with it when band conditions were good.

7) A transmatch can be used to match the random-length wire to the transmitter and receiver.

8) For instance, a two-element three-band quad, with the elements mounted only 35 feet above ground will give good performance in situations where a triband Yagi will not.

9) (50-ohm cable) The additional loss caused by an SWR as high as 2 to 1 will be inappreciable even in cable runs of several hundred feet when the frequency is as low as 7 MHz.

10) As long as the ground-screen radials are approximately 0.2 wavelength at the lowest frequency, this length will be more than adequate for the higher bands.

11) The length of the antenna is not critical.

12) An antenna resonant near the low end of the 7 MHz band will operate with a low SWR over the 21 MHz band.

13) (100 feet of 300-ohm receiving type twin-lead) With an SWR as high as 10 to 1, the additional loss caused by standing waves is less than 0.7dB.

14) 1dB represents the minimum detectable change in signal strength.

15) (100 feet of open-wire line) If this line was used (30 MHz) with a VSWR of 20:1, the total loss would be less than 1dB.

16) A center-fed antenna having an overall length of quarter-wavelength (instead of half-wavelength) probable efficiency will be 70 to 80% or a loss of 1 to 1.5dB.

17) A large number of radials, even though some or all of them have to be short, is preferable to a few long radials.

OK, I'll just bet there are some red faces and gnashing teeth out there. Some of you are pounding the table. "That guy has really gone too far this time; I'm going to write him a letter and set him straight. How does he get away with printing such rot?"

I'll bet some of you are really ticked off. Right! You should write a letter. Vent all your anger.

However, after you write your scorching letter, don't send it to me. Send it to Dave Sumner, K1ZZ, at 225 Main St., Newington, CT, because I took all of the above out the *The ARRL Antenna Book*.

(KNS, like the Lone Ranger, has his identity protected. Every month or so, he leaves a silver bullet here.) □

To keep you, the reader, alert, four inconsistencies have been purposely included in this book. When you find one, you, too, can say, "Aha!"

45

Kurt N. Sterba

The role of the dissident

So it won't appear that we're trying to start an argument, or embarrass anyone, we're not printing the name of this letter writer but will mention that it was from an old timer.

ENOUGH ALREADY! Some of your articles include worthwhile antenna information but they always include a jab at Newington which is both boring and in poor taste.

Why not accentuate the positive and concentrate on writing about antennas which is supposed to be the subject of your column?

Actually, we need a strong national organization and I would like to see group efforts for any needed improvements — majority support of said organization.

You and Lil Paddle keep up the good work please, more on antennas and much, much less on the other subject.

Thank you for listening and seasons greetings to all.
very 73.

Reply

OK. Well put and well taken. First, I may say anything about the ARRL I want to, as I own it!

Yep, I own about 1/125,000 or it, the same as you. Or put another way, it comes to .000008 of the stock. And when one has power like that, he expects to be listened to. Seriously, I'm really as pro-League as anyone. Am a Life Member and have held many appointments dating back to the OES. I've defended the ARRL at club meetings.

However, I can say that the typesetting in the new *ARRL Antenna Compendium* book looks terrible. There have been some Directors who were absolute ding-dongs, and even some of the Presidents have been buffoons.

Which is of course, no different than Congressmen and Presidents of the USA, which I also support.

Now, as to jabs at Newington in the antenna column — we received letters supporting our position on the horizontal loop.

As to the prior one outlining various phrases... I picked out topics about which people had written to this column. And then I said if you disagree with those statements write to the ARRL because they were from the *ARRL Antenna Book*. Well, every single one of those statements were exactly right! I figured many would write to the ARRL disagreeing, and maybe if the League wrote them back and explained the facts to them, I'd get a lot of people off my back.

Dirty Trick. Or maybe some would say, "Well, if it's in the *Antenna Book* (which they obviously hadn't read) maybe it's right."

I wonder how many I suckered into writing to the ARRL with "What are you guys talking about..." letters?

Yep, all 15 statements were 100% correct. So what may have looked like a jab at Newington (all hail) was really a crafty Kurt trick to prove a point. Which was, the book is right and (for some) you're WRONG!!!! (Lil Paddle sez: I didn't think it was crafty, I thought it was corny. Keep it up, turkey, and the only thing keeping you warm at night will be that BC-610 you have in the attic.)
□

There are twenty inconsistencies in this book which have been purposely planted to enable the reader to say, "Aha!" when he finds them.

Kurt N. Sterba

An older shippersnapper (that's what Bill Levin, NJ7G, calls himself) wrote recently, taking me to task for my January statement in this column about high VSWR. I stated that there was really nothing to worry about in the normal antenna installation, even if the VSWR was as high as 5:1 I'm afraid the old whippersnapper was reading something into what I said that was not there. Let's go over it again.

What we said, to put it succinctly, is that high VSWR is not really a problem. The problem caused by high transmission line input VSWR is that transistorized rigs cannot handle it, although tube transceivers and linears are a bit better.

Walter Maxwell, W2DU, wrote a series of articles on VSWR which started in the April 1973 issue of *QST*. In his blockbuster series, Part I, he showed us a graph which appears in many professional books on antennas. It depicts additional line loss as a result of VSWR on that line. Assume the line loss is 1.5 dB when perfectly matched. The graph shows that for a VSWR of 3:1 on that line, the line loss as a direct result of the VSWR would increase by 0.66 dB. If the VSWR was 5:1, the additional loss would be 1.5 dB (When you look up the transmission line efficiency, although not stated, it is the loss at 68° F, terminated in its characteristic impedance.)

You'll probably find it impossible to put the full transistorized rig power into a 3:1 VSWR. So you use an antenna coupler (if your rig doesn't have one built into it,) and reduce the VSWR presented to the transmitter. This doesn't reduce the VSWR on the transmission line or the resulting additional loss in the line. But it surely makes it palatable for the transmitter to operate with its full power into the line.

What does it do to the signal strength radiated? In the above 5:1 VSWR example it reduces radiated power by 1.5 db which is one quarter of one S-unit.

The problem with high VSWR is not the antenna but the rig!

The following letter was also received recently:

Dear "Kurt N. Sterba" and "Lil Paddle,"

I really enjoy your column and especially your debunking of all the various "experts" we have in ham radio. Amateur Radio seems to have more than its share of "horse hockey" and "agin-puckey" as the early morning gang on 3895 in California would say.

I considered writing you about two of my *practical*, non-theoretical, experiences with antennas and then inventing my own "nom de plume" (that's French for "don't give your right name," said a character in one of dear old Fred Allen's programs), but then thought better of it. . .

I'll start with the most recent antenna story first. About 8 or 10 years ago we planned to vacation in the southern Sierras near a town called Dorrington on Highway 4, one hundred miles east of Stockton, California. (We liked it so much, we later bought a house there.)

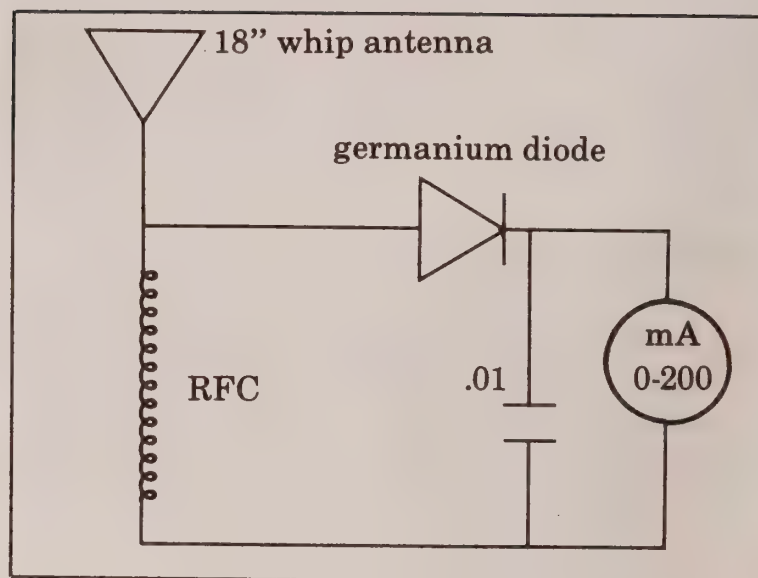
I decided to take my 10 watt, 2 meter rig for which I had just built a nice regulated 12 volt power supply as my only rig for this trip. I was casting about for a simple antenna to use in the rented house when we got there so I could talk to my friend Roby, WB6NXX, over a repeater he told me about. He was located in Paradise, CA, about 150 miles north of Dorrington. Since Dorrington is about 5,000 ft. elevation, I didn't think it would be any problem. About then a 73 *Magazine* arrived and in it there was an article about a simple "J" antenna for two meters with the whole thing made out of 300 ohm twin-lead. Perfect, I thought, and since I had plenty of 300 ohm twin-lead, I made one, carefully following the dimensions in the article. When we got there and set up, I found that not only could I not break that particular repeater, I could hardly even hear it! Now, what was I going to do?

I had brought no other equipment, no spares, not even extra wire. As I sat there looking at this so-called antenna, I realized that in the "J" antenna I was looking at, there was exactly one wavelength of wire and a light dawned in my head. I rushed outside, quickly found two long, fairly straight twigs and tied the middles together with my wife's sewing thread which she always carries, bless her heart! Then, with her sewing scissors, I cut the twin-lead apart and wrapped

this one wavelength of wire into a quad loop around the twigs. My gosh, what a difference; here I was working with exactly the same piece of wire, but now I could not only break the repeater, but I could receive it, full quieting! Not only that, but by turning the quad loop sixty degrees, I was able to work another repeater on the same frequency that I couldn't even hear before!

My previous experience with a "J" antenna happened in 1946, the year I got my ticket. My old mentor, Loyal Mealer, W6AK, God rest his soul, invited me to go to a hamfest in Sacramento that summer. But, there was one condition; I was to get his mobile "J" antenna working right. The government had released 25 Abbott (not Drake) TR-4s and he and all his friends were using them mobile with various antennas. Loyal had built a "J" antenna from a *QST* article. It was made of two lengths of copper tubing, one length $3/4$ wavelength long and one length $1/4$ wavelength long about three inches apart with their lower ends fed with 75 ohm twin-lead. These two copper tubes were mounted on nice ceramic insulators which were in turn mounted on a piece of plywood which was cut to fit the upper part of the side, back window of his new car. You rolled the window down, put the plywood board in place, then rolled the window part way up to hold the board firmly.

The free $1/2$ wave portion extended vertically well above the top of the car and it should have worked fine — but it didn't. He said that it was very embarrassing to have the same rig as 24 other guys, but be putting out the weakest signal! So after some headscratching, I built a simple field strength meter (see diagram), and put it as far as I could from the antenna on the car, and still be able to read it. Then I disconnected the 75 ohm twin-lead from the bottom of the "J"



antenna, connected them to two spring-type grid caps that just fit the copper tubes and could slide up and down the lower $1/4$ wave section of the "J." As I reached the right spot, the field strength meter pinned its pointer! I had to take off the little $1/4$ wave antenna and put in a shorter wire to keep the pointer on scale! Then I found the best spot, soldered the feedline directly on the copper tubes, and I was then allowed to accompany him to the hamfest! And, wonder of wonders, now W6AK had the *strongest* signal out of the 25 identical rigs; and could work mobile over 25 miles away to the fixed station on a picnic table, when no one else could! We both were absolutely delighted.

So, there are my stories; they really happened and it was done without math, with very little equipment, and absolutely no "horse hockey" or "aginpuckey"!!!

Your appreciative friend,

HAL BALYOZ, W6YBP
Flagstaff, AZ

There are fourteen inconsistencies in this book which have been purposely planted to enable the reader to say, "Aha!" when he finds them.

Chairman Kurt and his lovely wife, Lil, have taken advantage of the warm spring weather to trek to the mountains for a second honeymoon (their first was a disaster... the antenna wire was all in knots).

So in lieu of their regular column (or should I say irregular?), we print the following letter.

Ray Petee, NO6I, of Carson, California, wrote the following:

Dear Kurt and Lil' Paddle;

I thought you might be interested in my flag pole antenna, which is an adaption of a folded unipole. This antenna was conceived after I read John Haerle's book, "The Easy Way."

As you can see from the picture, I live in a mobile home park where external antennas... are prohibited. I have been using all kinds of hidden antennas with very little success. It has been obvious that a flag pole was the best answer. There are one or two other flag poles in the park so I was sure I could get away with it, if I could make it inconspicuous. I had been planning to put my old Hygain AVQ-14 inside a PVC pipe when I read about the folded unipole.

I knew I couldn't do exactly what W5IIR did because of all the ropes and wires, so I put my knowledge of sailboat mast with three shrouds (guy lines for land lubbers). I found an old junk mast about 2 ft. 2 in. long and extended it 4 ft. with 2 in. aluminum tubing. The shrouds start at the top of the mast, leaving about 4 ft. for top loading.

I feed the shrouds against ground with 450 ohm ladder line to a Cubic ST-2 tuner. The mast fits over a 2-1/2 in. pipe, 4 ft. into the ground, and I attached 4 or 5 34-ft. radials running under the decorative rock around my mobile home.

The spreaders are insulated from the shrouds by PVC pipe threaded end fittings. The shrouds are #14 antenna wire and covered with plastic from the spreader down. Two-inch PVC pipe and caps conceal the strain insulators and the antenna feedline, which runs underground for about 4 ft. into a 1-1/2 in. PVC pipe. The rest of the feedline runs under the coach to the shack.

The antenna works just fine on 80 through 10 meters, and I am enjoying hamming again. It just proves what you have been saying all these years about SWR and non-resonant antennas. Keep up the good work — I enjoy your articles. □



Guy lines enhanced for better contrast against the sky.

48

Lil Paddle

Amidst much weeping, wailing and gnashing of teeth, one hears, "I can't work the phone and CW bands of 80M because of the high SWR." How many times have you heard that plaintive cry — or even said it yourself?

Well, it's all nonsense! A recent magazine article fueled this madness by talking about an SWR of 8 to 1 on the band edges with an 80M antenna cut for the middle of the band.

While there are those who feel that the slightest flicker of SWR will result in either their soul wandering aimlessly through eternity and/or their rig being taken away, we say — *SO WHAT!*

It is now time for reality to raise its ugly head. For the sake of illustration: You are feeding your 80M dipole with 100 feet of RG-8/U foam. The loss in 100 feet at 4 MHz is .3 of a dB.

Now, a feedline with a loss of .3dB and an SWR of 10 to 1 has a mismatch loss of a "gigantic" 1 dB. Yes, 1dB — about one-sixth of an S-unit. See why we say "so what?"

Your little old tuner does its matching job, and no one can hear the difference!

This nuttiness about SWR has led to such bizarre hammy stuff as one amateur crying out loud (and a major magazine printed it) about the fact that his neighbors are complaining about his nine dipoles. He really only needs *ONE!*

Yes, only one. All bands. Put up your dipole and feed it with open wire.

Hah! you are saying. How do I get that open wire into the house? Well, just tack on 6 or 10 feet of coax to the open wire, and you are in the house just like what you ordinarily do.

"Horrible mismatch," some folks cry. *You don't care!* First, the open wire — for all practical purposes — is lossless. And how much loss, at any SWR, is there in a few feet of coax? (Purists may wish to use a balun.)

This SWR madness over 75/80 has resulted in one company marketing an antenna which it claims will cover the whole band — price: \$230. No, this is not a self-supporting quarter-wave vertical; this is a dipole!

Factor .9811049

1	4,000.0000 kHz
2	3,924.4196
3	3,850.2672
4	3,777.5160
5	3,706.1394
6	3,636.1115
7	3,567.4068
8	3,500.0002

Factor 1.0192590

1	3,500.0000 kHz
2	3,567.4065
3	3,636.1111
4	3,706.1389
5	3,777.5154
6	3,850.2665
7	3,924.4187
8	3,999.9990

Chart A

Should you disregard all the above, and the fact that I've given you an every-band antenna, and are still searching for the magic of absolutely no flicker on your meter, build the following for about \$30. I'll have saved you \$200, and you can split it with me. Make out your check to IMRA, HANDI—HAMS, ARRL Foundation, *Auto-Call* Scholarships, QCWA or your favorite Amateur Radio organization, and I'll send it on to them.

Buy about 136 feet of eight-conductor rotor cable — get the thickest wire version.

You now have eight wires. You could cut them for, say, 3.500, 3.570, 3.640, 3.710, 3.780, 3.850, 3.920 and 4.000.

Using the "468 divided by the Frequency MHz" formula, the lengths would be 133.7, 131.1, 128.6, 126.1, 123.8, 121.5, 119.4 and 117.0.

But for those of you who put on magnifying glasses so you can cut antennas to the nearest half-millimeter and believe there is some magic resonance because antennas "vibrate" like a tuning fork, we'll carry this to the ultimate absurdity. (See charts.)

The wire for 3,500 kHz is 133.71428 feet long. That's 133 feet and decimal .71428 of a foot, which (X12 in.) gives you 8.57136 inches. We now have .57136, which we apply against 16 (for 1/16 in.) and we come up with 9/16 inch. The antenna length is 133 ft. 8-9/16 inches.

The result of all this is: Having now built a frequency counter so accurate that you can call up WWV and tell them they're "a bit off" today,

Top to bottom

4,000.0000 Minus kHz	Wire length	kHz
3,924.4187 - 75.5813	+ 2.25333	33.54
3,850.2665 - 74.1522	+ 2.29669	32.28
3,777.5154 - 72.7511	+ 2.34093	31.07
3,706.1389 - 71.3765	+ 2.38602	29.91
3,636.1111 - 70.0278	+ 2.43196	28.79
3,567.4065 - 68.7046	+ 2.47881	27.71
3,500.0000 - <u>67.4065</u>	<u>+ 2.52654</u>	26.67
500.0000	16.71428	

133.71428-117.0=16.71428 ft. Ave. 29.91 kHz per ft.

Chart B

Bottom to top

3,500.0000 Plus kHz	Minus ft.	Ft. per kHz
3,567.4065 + 67.4065	- 2.52654	.0374821
3,636.1111 + 68.7046	- 2.47881	.0360792
3,706.1389 + 70.0278	- 2.43196	.0347246
3,777.5154 + 71.3765	- 2.38602	.0334268
3,850.2665 + 72.7511	- 2.34093	.0321772
3,924.4187 + 74.1522	- 2.29669	.0309726
4,000.0000 + <u>75.5813</u>	<u>- 2.25333</u>	.0298133
500.0000	16.71428	

Average .0334285 ft. per kHz

Chart C

you can set your transmitter at 3.7061389 MHz and be really right on. This must be Valhalla, your antenna is truly "humming."

Eureka! No more "I can't operate phone and CW." But I wonder why I've done this, because if all the 75 phone men go down to CW, we'll have to have a new CW abbreviation. Taking its place next to hihi, pse, tnx, fer, ur, r, ge and all that will be BG for "by golly."

Moving on to a new subject, there is a book out that tells you to lay out 120 radials, a half-wave-length long. While that would be ideal for a

vertical... for a Yagi, quad, dipole, and we quote, "attached to the tower," the idea is pure hooey. (Kurt's had a deleterious effect on my language.) There's a much better way to spend the money that 4,000 feet of wire would cost... silver-plated coax connectors would be a good place to start.

Certainly, if you ran this radial system out maybe 20 wavelengths or so there might be a slight effect. To double-check this point, I called up my MIT friend on the phone and asked him about using the half-wavelength radial for a Yagi, and his answer was "Balderdash!" □

49

Kurt N. Sterba

Just got off the phone, talking to *Worldradio's* Chief Op N6WR. He told me that, while working in his booth at Dayton, he took some heat about things I had written.

One amateur got all over him about a book review I had done some years ago and that I had done a terrible thing, I was all wrong, and on. The angry amateur said the book's writer was brilliant and was a person of accomplishment, etc.

Confronting Noble years back, the writer of that book also said I was nitpicking.

Well, this was the book that told Ned Novice

that on Day #1 he should dig a 50 cubic foot hole in his back yard for a ground system. The effect this would have on dipole radiation is absolutely zip.

Anyway, thinking that maybe I had been too harsh, I looked through the book again. I found more weird things that I missed the first time through.

For example: Fast Scan TV on 20M! Bud, let Ol' Kurt warn you, if you put a Fast Scan TV signal on 20M, hams will stop talking about the Woodpecker and start talking about you. You'll have a signal 2 MHz above and 2 MHz below the 20M band.

The FCC, with your violation notice and handcuffs, will land their helicopter in your front yard, and the KGB will be assaulting your house from the back because you are messing up Radio Moscow.

Then there was the statement that if you don't have a perfect match between feedline and antenna, "you will waste a tremendous amount of power in the form of heat at the feedpoint." **WRONG!**

The loss is not at the feedpoint at all, rather, distributed along the feedline.

I also saw that the Yagi reflector was $3/8$ of a wave in front of the driven element. Not so. One quarter at most.

I don't care if it was Dr. Jonas Salk writing a book with bum antenna dope, I'd say so. Twaddle is twaddle.

I've mentioned this before, and I'll do so again. If anyone writes a book on antennas, send it to me first and I'll look it over so you don't embarrass yourself.

Why do I write the way I do, about the things I do? Because I don't want to see any of my reader-friends getting a hernia trying to put up a 3L 20M Yagi with a 44 ft. boom, which is what would happen if you followed the spacings in the above mentioned book.

And how can I say the things I do? Well, I put up my first vertical long before that December day that the JAs went Maritime Mobile in Zone 31.

I'll share with you something that was the most fun I had last month. I got one of those letters telling me I'm all wrong, etc.; then he said it's a good thing there are ARRL publications to refer to instead.

So, I just photocopied the pages from the *ARRL Antenna Book* that agreed with me and sent it to him. No reply.

But, so people don't get their noses all twisted out of joint when I point out silly stuff in books, from now on I'll just write the corrected version

and never mention the book's title or author.

The Bobbsey Twins (real clue) have a book out in which they claim that after you run all radials out (like spokes from a hub), you should connect them all in an outer ring. This is a total waste of time, money and effort.

Then there was some stuff about hammering 4 ft. ground rods into the earth at the ends of the radials. This is great, but only for the purpose of getting some exercise.

Speaking of exercise, a great deal (and rightly so) has been made of how during the Big One, hams went into communications in the service as an already trained pool. The story not told much is that a lot of them, the victims of smokes and coffee, up all night working DX and no exercise, were in such bad shape that not even the Army would take them.

Anyway, this book with the yellow cover says that between your tuner and the transmitter you should run another wire, not depending on the shield of the coax. **WRONG!** Because then you'd have an RF loop like the audio loop that some may be familiar with. If the shield is bad, replace it.

If you have the condition described in the book, pray tell, just what would be the impedance presented by the center conductor and this other wire a foot away???

And fellas, you don't "resonate an antenna with a dip meter." You resonate an antenna by lengthening or shortening it.

One last word on this subject. When you read anywhere that you should bury the radials for a vertical about 2 feet under ground or so, that tells you that the writer has never figured out what radials are really there for!

Radials are there as RF catchers. The current in radials flows back toward the vertical and is reradiated. Logic tells one that the lower (or deeper) the radials are, the less RF will reach them. □

*There are three inconsistencies in this book which have been
purposely planted to enable the reader to say, "Aha!"
when he finds them.*

50

Kurt N. Sterba

Let's once and for all put an end to the fallacy that unless you have a perfect match, you will waste a "tremendous" amount of power.

Pure bunkum! Because something gets printed in a book, many people take it as gospel — it ain't necessarily so.

I give full permission for the following to be printed in any book, bulletin, compendium, photocopy, or any means of mechanical and electronic reproduction at no cost, but a credit line to me and *Worldradio* is mandatory.

There will be a little math. Do not let your eyes glaze over. . . follow it through. The truth shall make you free (of misconceptions).

You have 100W forward and 50W reflected. (Tearing out your hair? . . . Wait!)

- A) 50 divided by 100 equals 0.5.
- B) The square root of .5 is .7071067.
- C) Add 1 to that for 1.7071067.

Next step:

- A) 50 divided by 100 equals 0.5.
- B) The square root of .5 is .7071067.
- C) Subtract .7071067 from whole number 1.
- D) The answer is .2928933.

Next step:

- A) Divide 1.7071067 by .2928933.
- B) The answer is 5.8284252.
- C) Round off to 6.

You have an SWR of 6 to 1, which tells you that on the other end of your 50-ohm line the antenna is either 300 ohms or 8 ohms.

Now comes the big question. Is half your power wasted? Now comes my big answer. NO!

Let's say you are using 100 feet of RG-8/U foam. At 20M it has a matched loss of .6dB per 100 feet.

With an SWR of 6:1, you will lose (in the feedline) exactly 1 additional dB. Yes, one whole dB. No one will hear the difference!

Your tuner does the magic, for if the antenna is short (capacitive) and you see zero SWR (after adjustment), the tuner is now set inductive and it kicks the wave back up to the antenna.

Alternately, if the antenna is long (inductive), the proper setting of the tuner will be capacitive and thus the reflected wave will get booted right back to the antenna, whence it will truly radiate.

One point: Under the conditions described, an SWR of 6 at the feedpoint will only register 4.5 at the end of 100 feet of coax.

To prove the point even further: Say you have 100W up and 75W back down. Your SWR is 14 to 1. Hah, you say. Why, your own receiver right in the shack won't hear you.

Assuming you can match either 4 ohms (your antenna is a speaker?) or 700 ohms, the loss is 2-1/2dB or about half of an S-unit.

And yes, with proper values of the C and L you can match 4 ohms or 700 (and much higher).

With an SWR of 20 you will lose 3dB — not the best situation, but a loss which can hardly be called "tremendous." Actually, this extreme was used to prove a point. It is unlikely that your dipole will be either 2.5 ohms on one side or 1,000 ohms on the other.

That is not to say that some antennas couldn't be. Very, very short verticals will get down pretty low, and multiple wire flat-tops get pretty high. But you would likely match the vertical right at the base and the '20s vintage antenna would use ladder line, which is essentially lossless.

I read in a magazine that someone was complaining that the resistance markings on a manufactured noise bridge were not too accurate.

First, what do you really expect for \$60? If you want "accuracy," you have the option of shelling out \$30,000 for an HP or \$25,000 for a Boonton.

You know, by the time a small business pays the rent, lights, heat, phone bill, employee health insurance, social security, unemployment, and a whole raft of other stuff, plus office equipment, test gear, etc. (before we even get to the cost of the actual parts), we're lucky to get what we do receive for the retail dollar.

Next, with the noise bridge, if a 50-ohm resistor is used to calibrate the device, to show where 50 ohms should appear on the dial, everything will be just fine. On the other dial, if you short out the center of the female connector to the shield side, that will show exactly where zero reactance is.

When you consider what happens to a Yagi when it faces the power lines in the alley or rotates over the car in the garage — or even none

of the above, worrying about whether something is 50 or 53 ohms or a sliver of reactance is truly an exercise in nonsense. □

51

Kurt N. Sterba

In answer to readers' questions regarding all-band dipoles (called Zepps by some):

Q. It rains a lot here. Won't water play havoc electrically on open-wire?

A. No. The little rain water that would gather is meaningless.

Q. I want my antenna to be nearly invisible. Will small wire have a reactance problem? If I solder wires to make up the total length, will there be an impedance bump?

A. No. No.

Q. Should I use a balun as near the radiating element as possible?

A. No.

Q. Why shouldn't one bend open-wire 90°?

A. Radio waves travel at 186,000 miles per second. If there is a bend in open-wire, the wave is going so fast that it can't make the turn and leaps off to ground.

Just kidding! The 90° bend has the wires acting as a capacitor.

New subject. Some well-meaning young man wrote in to tell me I was wrong on something, and he told me he knew I was wrong because he was an "engineering student." Big whoopee — I eat engineering students for lunch!

He's probably shell-shocked from the full-page single-spaced letter he received. If you are going to tell me I'm wrong, you'd better quote me chapter and verse from Kraus, Terman, Doty.

There are two others — the late John Haerle and (I really feel bad I can't pull his name out right now. . . old age). He worked for RCA and wrote a scholarly series for *QST*; he lives in Florida now. Oh yes, it's Walt Maxwell, W2DU.

If you, like something I read recently, are going to tell me that "There is a price to be paid in using

a tuner — you could lose 4% of your power." Please! Save your paper and stamp.

I really don't want to have to explain to everybody again that you have to lose half of your power to drop a mere 3dB. Carry that through to see that 4% will never be detectable audibly or measurably at the other end.

I've been getting such weird mail lately. So people don't hoot at the "good guy" writers when they're at their ham clubs, I'm keeping them anonymous.

It comes mostly from those with the big "E." Maybe they should get a big flag with an "E" for Excellence on it like what used to fly over the defense plants.

"There you go again, taking pot shots at some of the well-known names in current ham radio literature. I hope you will be able to cease your campaign some day, but only when said authors stop providing so many tempting targets, and begin to write non-fiction for a change. In the meantime, keep up the good work."

"Don't let the complaints about your candor cramp your style. As you say, twaddle is twaddle, and if they don't like what you say about what they write, they shouldn't write garbage."

"May your standing never waver."

"Keep writing, we hams need you badly, although I am sure you must get frequent roasting from those who do not like you." (That was from someone I really respect — a man of great achievement.)

Also, a nice letter from R.B. in Colorado. Another from a pre-war W1 — thanks.

A question came in whether a vertical's radials should be buried a foot down or just a few inches. Please, put them at least a foot, maybe more. There are already too many good signals on the bands.

And, due to the mail, I take back my statement about the folly of 4 ft. ground rods at the end of your radials. They really should be 8 ft. ground rods and you should pound 120 of them. This would solve the problem of all the "center-loaded" hams one sees.

Then start bicep curls, squats and bench presses.

Would you believe that *Worldradio* received a letter calling me arrogant, rude and pompous? How anybody could say that about Mr. Nice Guy is just incredible. □

52

Kurt N. Sterba

WARNING! October 1988 issue of *23 Skidoo* has a bad mistake on page 83. In *Figure 2*, the top of the twin-lead feedline shows — alas — a direct short. It was most likely a drawing error.

Old-timers would catch it immediately, but I fear the newcomer would not. At the top of the feedline take out the rounded wire and insert an insulator.

I was recently amongst a group of hams and what did I hear? "A tuner just fools the transmitter." Gadfry! Can't we get rid of that awful piece of disinformation?

I'll make this statement: if you are concerned about the SWR, use a transmatch and eliminate all worries about power transfer and maximum signal strength.

There! Those who wish to snort and wheeze may do so, and we'll await the usual avalanche of poison pen letters. An amateur will come up to the *Worldradio* staffers at a convention and say, "He's hurting your magazine."

OK, for those who wish to tar and feather me, and ride me out of town on a rail, here is another statement:

Your feedline is 100 feet of 300 ohm twin-lead. Your transmitter is at 3.505 MHz. The SWR is 10 to 1. the operator at the receiving end will not hear the difference between this condition and a perfect match!

There it is! Oh, I can hear people reaching for their crayons now. Going to write me a real scorcher, huh? Go right ahead, but after writing the letter. . . address the envelope to K1ZZ at ARRL because I just took all that from page 26-1 of the new *ARRL Antenna Book*, and my earlier

statement is also from the same book.

"Even a 6 ft. vertical on 7 MHz can produce an exceptional signal."

Getting the lynch mob out? Send them to Newington, Connecticut — same book.

I could go on. I think the column I got the most swamp gas on was one in which I just took about 10 statements from previous ARRL books. HAH, HAH!

I've taken charts and put the plots into words and seen apoplexy as the result.

I'd also like to thank the nice people who comment, some at the conventions attended by *Worldradio* staffers who pass them on to me, and particularly most recently, the comments from the "cub."

Many have written in that I should do a book. That is indeed flattering, and I thank you for the thought. Actually, I considered it, but since Doug DeMaw, W1FB/8, has such a good book out now, there is really no reason for me to do so. I agree with about 99.999% of what he says, so buy his.

I do have a small booklet for \$2 which is titled, "Why a single-element vertical has a poor front-to-back ratio."

Also, I now manufacture antennas. These are guaranteed to be the finest isotropic antennas on the market. Prices 80M, \$8; 40M, \$4; 20M, \$2; 10M, \$1. Tax is included. Enclose an SASE in which your isotropic radiator will be shipped. Cash only.

I'm writing this one week before the CQ Phone Contest. I'll be in it with yet another antenna of the absurd.

Having gone through loading up metal ladders, automobiles and the like, this time it will be a true "disguise" antenna. I'll be writing about it — an

antenna that nobody thinks is an antenna. That is, if it works.

Ending with a little tip. Should you need more bandwidth than the average dipole gives you, use 300 ohm line or 600 ohm open wire instead of just putting wire on each side of the center insulator. Short both ends of your quarter-wave sections and feed in the usual manner. The extra width does broaden the frequency traverse between the 2:1 SWR points.

Letters are always appreciated; all are an-

swered, eventually. All your antenna problems are solved.

(Kurt N. Sterba, Worldradio's man of mystery, residing in Shangri-La, maintains anonymity so he can even, on occasion [besides hooting], praise the good guys without quid pro quo expected nor desired. Hiding under a nom de plume prevents any semblance of influence by mentioned parties or products.) □

53

Kurt N. Sterba

For a variety of reasons many Amateurs need hidden antennas. There is the pressing question, however: can an antenna that can't be seen be heard?

Let's find out. As you know trees are bad for radio waves. Especially for waves coming from vertical antennas. So, let's hide the antenna by putting it IN the tree.

You can hide a 10M vertical in a small tree. It takes a bigger tree for 15. This episode will be about a tree and a 20M antenna.

Quarter-wave vertical on March 4-5, 1989. ARRL International DX Contest. My pea-shooter against the howitzers. I look at papers on the wall from long ago: Contest Achievement Award, #1 Phone, First Place. Others are in file folders dating back to my old "K" call. But now my effort is not aimed at self, but to offer some hope to those who, for one reason or other, must maintain a low profile.

An antenna in a tree is about as low as you can get.

Let's see. The Amateurs with towers so high they have to take oxygen up with them when they work on the antenna, they contact that airplane P40, so do I.

ABBC: Argentina, Bolivia, Brazil, Chile. The Equator country, Mexico and Belize too. Who you say? UZ and UB. A long one way out in the Pacific and then Hawaii. There's KH6FKG.

While some contest types are like a machine, not a spare word or breath (they wouldn't even slow down to tell you that your house was on fire), FKG can wish you an Aloha from the islands in a most pleasant manner.

VP5T, possibly the smoothest on the air. Very fast rate without sounding like a robot.

Unlike those who didn't read the rules closely, I know that Alaska counts as DX and there's another in the bag. I can barely make out some weak JAs, but they pop right back to my call. Amazing.

No, I'm not chugging along at a hundred an hour but I see contacts at :27, :29, :30, :33, :35, :37, :38. For those who might sneer at such a rate, remember, wrapped around my antenna is the RF Cookie Monster saying "feed me, feed me."

Those who were on in this contest on 14 MHz know well that propagation has seen much better days. But even yet a UL, G, YU and UP, UQ, OH, CT1, F and I, HG, ZL.

I'm honor bound to tell you that there were some calls that resulted in nothing. There were long periods of effort with nothing to show. There were pileups I just avoided. A masochist I am not.

But eventually I worked almost everything I heard. I had runs, if such can be called "runs" of :33, :35, :37. Another went :16, :17, :20, :21, :23. Later a KP4, NH2, VP2 and UA3, just zooming about the planet. There was some barking into the wind but there was also a lot of snap, snap.

Looking at my ARRL World Map on the wall,

I've worked Brunei way up at the upper left and ZS6 down at the lower right. Kazakh up at the top and South America at the bottom and 9Q5 over there.

I also read a book, some newspapers, left the house for awhile, sat down to real meals, and, unlike some contest nuts, got a full night's sleep both nights.

I think I proved a point that the minimally antennaed station can go into a contest and have fun. Yes, FUN. The chase can be exhilarating. I might even put in for the Worked All Continents certificate earned over the weekend.

Just wanted to give a little hope and show that you don't have to be King Kong to have a good time.

Further adventures of the antenna in the tree. QCWA QSO Party March 11-12, 1989.

On 20M — Alaska to Florida, New York to California. And, while tuning the band a UQ1 on first call.

Had some other things that I had to get done but while I was paying attention to the radio, contacts at :42, :44, :46. There was a :51, :53, :54, :56. And a :40, :41, :43. I also had a :51, :52, :54, :56, :58, :01, :03. Was so pleased with myself I left to go have pizza.

I was called by stations so weak that I couldn't make them out until I turned on my Palomar preamp. OK, I guess I've proved that you could load up and work out with about anything, so try the railing on the balcony at your condo.

Now let's try something silly. I'm going to get on 10M with my quarterwave co-ax fed 20M antenna!

Using the MFJ 949C Deluxe Versa Tuner II, I put the feedline into Coax 1 connector. My V Beam is on Coax 2. That's how I keep them straight. Vertical is on 1, which is vertical and the two-wire antenna goes into 2.

So now we're going from a quarter-wave antenna on 20 to a half-wave antenna on 10. "Oh, Boy," you are saying. End-fed half-wave have mucho impedance. You are right.

However, twist knobs until, with maximum forward power going that way, reflected needle lies flat without even a twitch when trans-

mitting. Work stations. Do the same thing on 15.

The nice thing about this tuner is that you can compare, with but a flick of the wrist and a knob, Direct (no tuner in circuit) and through the tuner. BIG difference!

To another subject. Back in November I mentioned the names of writers on antenna subjects whom I respected. And I said there was one other, but I couldn't think of his name. I got a letter from Missouri calling me lazy. Well, Bub, all I have to say is, your turn is coming. In time you'll have those short circuits too.

I never thought such would ever occur to me. That was for other people. I remember the days on the basketball court, baseball diamond, boxing ring. Now a couple of trips up and down the steps to the cellar and I'm winded. What happened to that ramrod who looked so sharp in his khakis? On D-Day 1944 I was in Washington, the Pentagon was feeding my face. Later I would see London, Paris, Munich (did you drink a beer at the Red Ox in Heidelberg) and Tokyo. Three up and two down. The BC-610, the BC-342, great days.

For, oh, so many years, on 20 I'd pride myself on being able to make out call signs by heavily accented DX stations. I'd make them out when others couldn't. Now, all their English is better and my hearing is worse.

Anyway, we have the oaf from Missouri on one hand and on the other was a letter from a gentleman — Walter Maxwell himself. Class tells, as they say. Of course that was who I meant. I mentioned he had been with RCA, now lived in Florida, etc.

I'll share his letter and letters from others with you in volume II. And maybe when things go "blink" for Missouri and he starts locking his keys in his car and other missteps, he will become more charitable.

(The identity of the writer must remain behind an I.Ron Curtain. Deep cover is the only way he will pen his reports. He leaves a silver bullet and rides off into the night. Upcoming will be more puncturing of the balloon of antenna mythology.)

ADDENDUM

Addendum to page 39: Rodger Runyan, WBØGOB, reports on 13 April 1992,

I have found this antenna to work quite well on 40 M, which has netted me 150 countries and not quite as well on 80 M — only about 60 countries.

This antenna has hopes for the experimenter.

Each wire is insulated from the other, which introduces a capacitive effect. I am now in hopes of experimenting with eight-conductor cable 100 ft. in length for a possible 800 ft. of wire in a limited space. Who knows, maybe 16, 24, etc. conductors 100 ft. long could be “Avril & Fooster’s” next product. Hi hi! □

EPILOGUE

So there you have it. A lot of information (and we hope a few laughs) for a measly \$10.00.

That's less than going to a movie (that you'll soon forget) along with some popcorn and some sodium-laced diet soda raising your blood pressure.

You may wish to buy a copy of this book for a friend. Only \$10.00 and \$2.00 for shipping costs and handling in the U.S. \$4.00 p/h to non-U.S. ZIPs. California, please add tax.

Kurt and Lil say they would be pleased to hear from you regarding this book. Your letters will be forwarded if you write to **Worldradio**, 2120 28th St., Sacramento, CA 95818 USA.

Standby for Volume II, which will include the famous "Shopping Cart" antenna! □



NOTES

Worldradio

SUBSCRIPTION ORDER FORM

P.O. Box 189490, Sacramento, CA 95818

YES! I want to read Kurt Sterba's column every month as it appears in *Worldradio*. Sign me up for the following term:

Name _____ Call _____

Address _____

City _____ State _____ ZIP _____

☐ New

☐ Renewal

to CA addresses

Non US ZIP

☐ 12 issues: \$14

(\$15.09 CA)

\$24

☐ 24 issues: \$27

(\$29.09 CA)

\$47

☐ 36 issues: \$39

(\$42.02 CA)

\$69

☐ Lifetime: \$140

(\$150.85 CA)

\$240

☐ Check enclosed

☐ VISA

☐ MC

☐ Am.Exp.

Card number _____

Signature _____ Exp. date _____

or call (free) **1-800-366-9192** (credit card orders only)

